

East Paradox Land Health Assessment 2010-2011

Bureau of Land Management
Uncompahgre Field Office



Memo

To: Barbara Sharrow
From: Amanda Clements
Date: September 7, 2011

The attached report describes the findings of the Land Health Assessment for the East Paradox Area. A rapid assessment process conducted in 2010 was used together with existing data to make determinations of whether the area was meeting or not meeting the Colorado Land Health Standards. The report contains acreages meeting and not meeting the standards, types and locations of problems occurring on the land, and recommendations for addressing the problems. This report should be used and referenced in the NEPA analysis of all subsequent actions occurring in the East Paradox Area Landscape Unit.

I concur that this report constitutes the Land Health Assessment for the East Paradox Area and fulfills the requirements for an evaluation of the landscape unit relative to the Colorado Land Health Standards.



Barbara Sharrow, Field Office Manager

Date: 9-15-11

Executive Summary

The East Paradox Land Health Assessment (LHA) is the second landscape unit in the Uncompahgre Field Office (UFO) to be evaluated for Land Health Standards a second time. This area was first evaluated in 1999-2000. Since that time, much about monitoring and managing for land health has been learned from the subsequent years of LHA work. This assessment continues a new approach intended to be more quantitative, repeatable, and efficient. It is also expanded to address the variety of activities and uses that occur on the public lands. The goal of this approach is to improve the link between determinations of land health, the nature of land health problems, identification of causal and contributing factors, and development of remedies. The desired result of this new approach is to facilitate improved management for land health.

To support the new approach, this document is set up to provide key information relating to Land Health Determinations, Causal Factors, and Remedies to address land health problems. A description of the LHA study methods and a broad overview of the East Paradox area add context. A discussion of past actions in the Adaptive Management section is also included. Detailed information covering the existing environment, study results, data summaries, and development surveys is provided in the Appendix. The Appendix is also designed to include a section of documents that represent the first steps toward implementing the remedies.

Land health determinations show that the majority of the nearly 80,000 acres of public land in the East Paradox unit meet Colorado's Standards for Public Land Health. However, substantial acreages within the unit were found to have some or even many problems with land health indicators. Much of this acreage is in the central portion of the unit, in the bottom of Paradox Valley.

The Land Health Standards are analyzed separately in order to better identify the nature of land health issues. The majority of lands in the East Paradox unit meet Standard 1 (soils). Streams show mixed results with more streams meeting Standard 2 (riparian) with problems than in the other categories. The majority of lands meet Standard 3 (plant and animal communities), but there are more problems than seen with Standard 1. Standard 4 (Threatened, Endangered, and Sensitive Species) was evaluated for both uplands and streams, with similar findings to Standard 2 and Standard 3. More streams meet Standard 5 (water quality) than have problems meeting. At a landscape level, these numbers do not reflect major shifts from conditions found ten years ago during the first Land Health Assessment, with the same general areas showing land health problems.

2010-2011 Land Health Determinations for the East Paradox LHA unit.

	Lands and Streams Meeting (acres— % of unit)	Lands and Streams Meeting with Problems (acres— % of unit)	Lands and Streams Not Meeting (acres— % of unit)	Not Evaluated or Not Applicable (acres— % of unit)
All Standards	49,615 / 62%	25,718 / 32%	3,123 / 4%	1,347 / 2%
Standard 1	70,585 / 89%	6,995 / 9%	0 / 0%	2,224 / 2%
Standard 2*	388 / 41%	489 / 51 %	0 / 0%	80 / 8%
Standard 3	49,971 / 63%	24,486 / 31%	3,123 / 4%	2,224 / 2%
Standard 4	50,359 / 63%	24,975 / 31%	3,123 / 4%	1,347 / 2%
Standard 5	725 / 76%	152 / 16%	0 / 0%	80 / 8%

* Percentage figures for Standard 2 and Standard 5 show the land health determinations as a proportion of the total riparian and stream channel area.

A major focus of the Determinations section is to highlight the nature of land health concerns so that appropriate management solutions can be identified. Developments are also analyzed in this document to identify how they may be influencing land health. The Land Health Determinations are based on results of upland and riparian biological studies that are located throughout the East Paradox Unit, but intentionally placed away from developments and site specific disturbances such as roads or livestock ponds. Because we know that such developments and disturbances can affect indicators of land health, a separate analysis of developments is presented. The Determinations section includes this analysis to identify which indicators of land health are influenced by each type of development. The studies and the development evaluations combine to present a more complete picture of the favorable outcomes, general concerns, and trends in the East Paradox unit.

The Causal Factor section is also formulated to help develop management solutions for lands with health problems. Analysis of causal factors reveals a complex picture of interacting agents that are associated with land health problems. These are based on information collected at the upland and riparian study sites, and include drought, historic livestock grazing, noxious weeds, water diversions, altered river flows, and wildlife use, along with many other, lesser factors. The development analysis is used in this section as well for additional insight into how developments, authorizations and casual uses of BLM land could be contributing to land health problems. Among all the different types of developments, authorized and casual uses of public land in the East Paradox unit, the most widespread and most influential to land health indicators are abandoned mines, Uranium exploration disturbances, and BLM roads.

Remedies that have been identified to address the land health problems vary from specific to general. The Remedies section is formatted to show the link between specific land health concerns and proposed management solutions. They include actions ranging from development of improved Best Management Practices (BMPs), to specific projects like restoration of the annual-dominated bottomlands of Paradox Valley, to improved weed management around stock ponds. While the list of remedies is long, many can be accommodated by minor shifts of the existing workload, or modification of activities that are already planned or underway.



The scenic Dolores River Canyon Wilderness Study Area lies in the western part of the East Paradox landscape unit.

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Old gravestones on BLM land near the town of Bedrock are evidence of the area's rich history.

Background

Purpose and Need

In 1997, the Resource Management Plans (RMPs) guiding management in the Uncompahgre Field Office (UFO) of the Bureau of Land Management (BLM) were amended with the Standards for Public Land Health and Guidelines for Livestock Grazing. This amendment established five standards which describe conditions needed to sustain land health. The standards are described in terms of indicators which can be observed on the ground. The amendment states that while it is not always necessary to collect data to evaluate standards, it is important to have measurable baseline data so that changes can be observed and measured over time. In addition, the BLM's authorized officer is to determine the amount and type of data each situation requires in consultation, coordination and cooperation with local cooperators and the interested public. Finally, it states that in areas where the standards are not being achieved, current uses and management actions will be reviewed and modified if necessary to assure significant progress toward achieving a healthy ecosystem. The amendment then lays out guidelines for livestock grazing that will be consistent with land health.

For several years following the RMP amendments, there was little BLM guidance on how land health should be assessed. The 4180 Handbook for Rangeland Health Standards was published in 2001. It described a general process of sampling, extrapolation, and determinations but it did not describe specific methodologies for collecting land health data. For the initial round of health assessments, the UFO used a landscape-based approach which required visiting many sites in each grazing allotment or other type of management area, collecting information based on ocular estimates in unmarked plots, and filling out quick health checklists. This was not a highly repeatable approach, particularly since no fixed plots were used, and because of the diversity of soils and vegetation in the UFO. During the Land Health Assessments (LHAs), local cooperators and the interested public were invited to take part. Very little interest was shown, and it became clear that while there was interest in the results, there was not evident concern with how the data was collected.

Based on this history, emerging issues and the need to improve work efficiency, UFO staff determined that a new approach to LHAs would be beneficial. The new approach still utilizes landscape units, but relies on existing biological monitoring studies. This provides for evaluation of trend, and improves repeatability. In addition, the new process includes monitoring the health impacts of developments, authorized and casual uses that occur on BLM. This provides general information on their impacts to land health, and specific information on their impacts in the LHA unit.

The most important reason to make this change is to create a stronger link between the data collected and follow-up management actions. This new approach will enable UFO to make better-founded determinations of cause. It will also help staff identify management actions which will improve land health, or address problems before they become serious. Except for changes in methodology, the original schedule for the Land Health Assessments will still be followed (Table 1.)

Table 1. List of Landscape Units and schedule for Health Assessments.

Land Health Assessment Unit	Last Assessment Period	Next Assessment Period
East Paradox	1999-2000	2010-2011
Gunnison Gorge	2000-2001	2011-2012
North Delta	2001-2002	2012-2013
Mesa Creek	2003-2004	2013-2014
Roubideau	2004-2005	2014-2015
Norwood	2005-2006	2015-2016
North Fork	2006-2007	2016-2017
Colona	2007-2008	2017-2018
West Paradox	2008-2009	2018-2019
Escalante	2009-2010	2019-2020

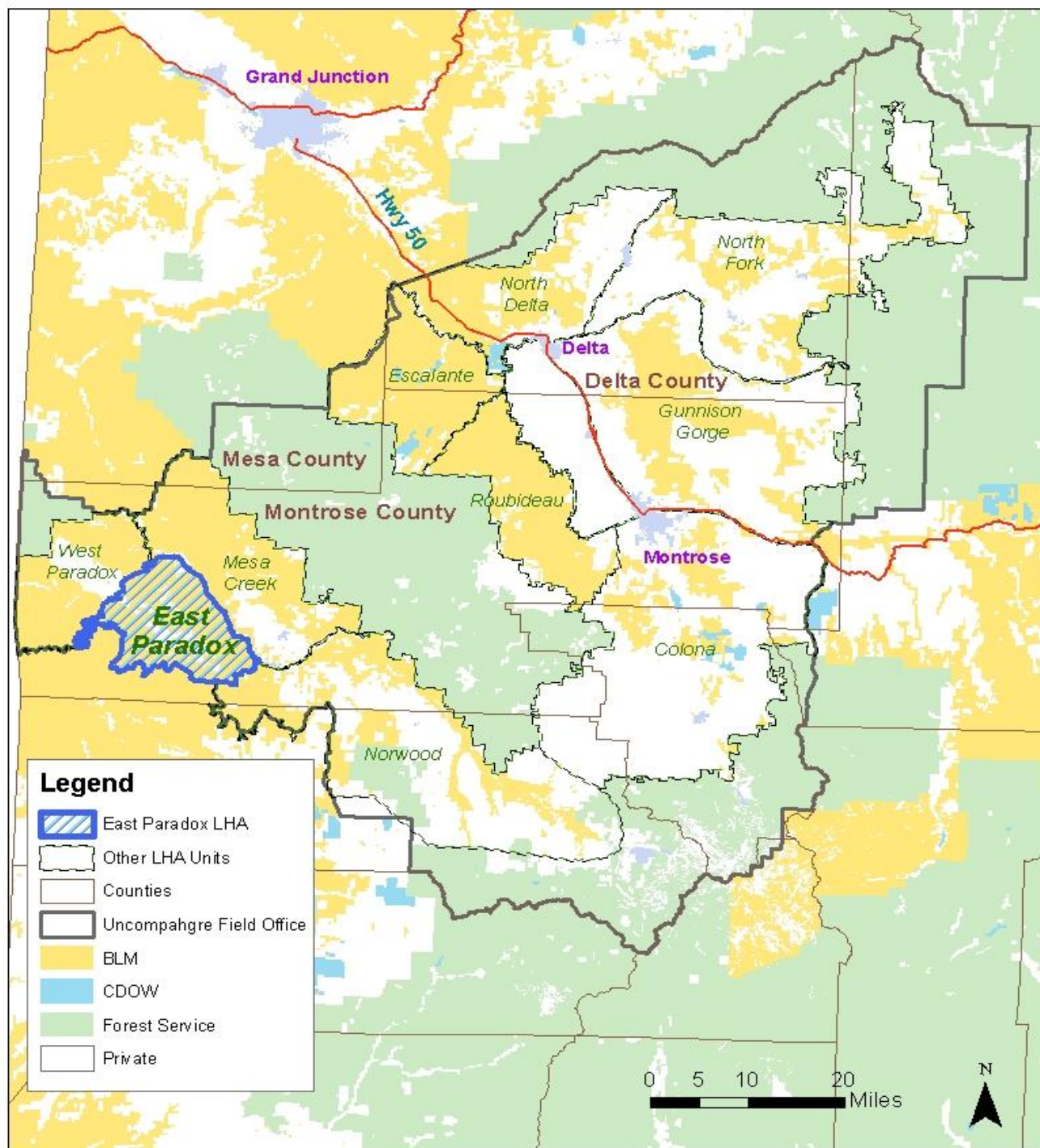


Figure 1. East Paradox Landscape Unit location map.

Overview of East Paradox Landscape Unit

Location

The East Paradox Landscape Unit is located in western Colorado, in the western part of Montrose County (Figure 1.) The unit lies within the western part of the Uncompahgre Field Office (UFO) of the Bureau of Land Management (BLM), and is nearly 95,000 acres in size. The unit is bounded by the San Miguel River which flows next to Colorado State Highway 141 on the northeast, the Uncompahgre Field Office boundary on the south, and the Dolores River on the northwest.

Land Status and Designations

BLM public land totals 79,803 acres, and makes up the majority of the East Paradox landscape unit (Figure 2.) Private land totaling just under 15,000 acres makes up the rest of the unit, with the exception of a small amount of land administered by the Bureau of Reclamation located in the Dolores River Canyon. Specially designated BLM lands in the unit are limited to the Dolores Canyon Wilderness Study Area (see Table 2.) The unit is currently under the San Juan/San Miguel Resource Management Plan, which is now being revised. A substantial amount of land is under Department of Energy (DOE) withdrawal, under which the DOE leases tracts for uranium mining. In addition, there are many mining claims, chiefly for uranium on much of the other BLM land in the unit. The East Paradox unit is divided into 9 grazing allotments which are useful regional subdivisions of the landscape, and are referred to frequently in this document (see Figure 2).

Table 2. BLM land acreages in East Paradox LHA unit by designation type

Designation	Acreage
Dolores Canyon Wilderness Study Area	8,393
Other BLM land	71,410
Total BLM land	79,803

Environmental Setting

The East Paradox landscape unit is remote, rugged, and geologically varied. The area falls into the Colorado Plateaus Ecoregion (U. S. Environmental Protection Agency, 2005). The unit includes the eastern half of Paradox Valley, which is framed by the high, sloping mesa country of Monogram and Davis Mesa to the southwest, and by Sawtooth Ridge to the northeast. Paradox Valley is within the Shale Deserts and Sedimentary Basins unit of the ecoregion, while the ridges on either side are included within the semiarid benchlands and canyonlands unit. The East Paradox unit is characterized by gentle but gul-
lied topography along most of the bottom of Paradox Valley. Impassable cliffs border the northeastern part of the valley, and very steep slopes form the southwestern valley rim. Monogram and Davis Mesa are relatively flat but dissected with a few steep canyons that feed into Wild Steer Canyon and on into the Dolores River. The Sawtooth Ridge country generally slopes more, and is highly dissected with many steep-sided pediments. Elevation ranges from 4,800' at the lowest point of the unit at the confluence between the Dolores and San Miguel River, up to 7,300' on the eastern end of Monogram Mesa.

The East Paradox landscape unit has a dry, high valley/mountainous continental climate characterized by low humidity, sunny days, clear nights, and wide ranging daily temperature changes. Precipitation is about equally divided between the winter and summer months, and has averaged 12.6" annually over the past 20 years at the nearby Uravan climate station, which is located at the northern end of the unit along Highway 141. Temperatures range from an average high of about 95 degrees F in July to an average low of about 16 degrees F in January, as measured in Uravan. The typical growing season is

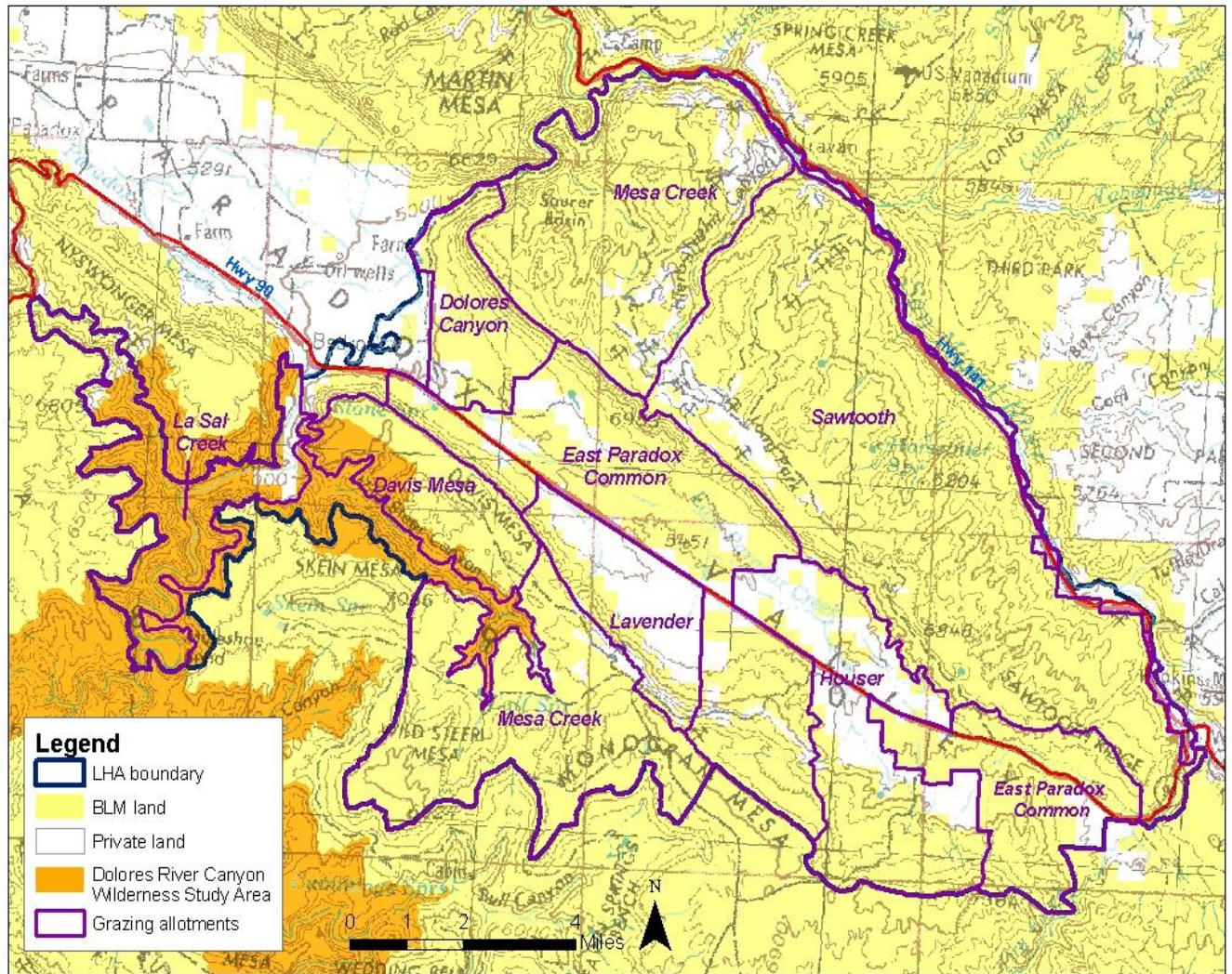


Figure 2. Land Ownership and Management Designations in the East Paradox Landscape Unit.

about 162 days long in Uravan and declines with increasing elevation. Temperatures decline and precipitation increases at increasing elevations elsewhere in the East Paradox unit.

The Legacy of Historic Land Uses and a Changing BLM

While few if any people live in the East Paradox unit today, the history of land use and management has led to many of the conditions we now see on the ground. Historically inhabited by the Ute Tribe which subsisted on hunting and gathering, the area was next settled in the late 1800s by European descendants. These settlers brought cattle into the area, and were soon grazing thousands of head in and around Paradox Valley. Historic accounts describe extensive impacts from livestock grazing during this period. While livestock numbers have been greatly reduced since that time, cattle continue to be the primary focus of agriculture nearby, and still graze on public land constructed over the past half century to improve grazing conditions for livestock. These include small reservoirs to provide water, fences, stock trails, corrals, spring developments, cattleguards, and vegetation treatments to increase livestock forage. A lesser number of similar developments and vegetation treatments have been carried out to improve hab-

itat conditions for deer and elk, since hunting has also been a popular activity in this area.

Shortly after European settlement, small farms which used river water for irrigation were developed along the Dolores and San Miguel Rivers. Numerous water developments were made over the years to support the farming and ranching activities. These included establishment of water rights and diversions which reduced flows in the rivers. These were most notable well outside of the landscape unit in the Nucla and Cortez areas. In the 1980s, McPhee Reservoir was constructed on the Dolores River and resulted in further alterations and reductions in river flows. Today the majority of the Dolores River flow is transported out of the Dolores River into the San Juan River Basin. While the San Miguel River has a number of diversions, the irrigation tailwater drains back into the San Miguel River, so flows have not been extensively altered from original patterns. The Dolores River has also been the subject Bureau of Reclamation salinity reduction efforts, as well as extensive tamarisk and Russian knapweed establishment.

Mining has had a major influence on the area, with minor developments starting in the late 1800s targeting placer gold. Radium, Vanadium and Uranium have been the focus of mining over the 20th Century. Mining activity was most pronounced during the Cold War, as this part of Colorado was one of the foremost areas for Uranium mining in the United States. Uravan was the center of activity with a Uranium processing mill and small town developed around the Uranium industry. Mining activity targeted the Morrison Formation which can be accessed along Sawtooth Ridge and westward, and around Monogram Mesa. The majority of mining was below ground, but at least one large scale open pit was developed. While only a few mines are active today, there is still abundant evidence from this activity across the East Paradox unit today in the form of mine adits, closed mines, exploration roads, and associated mining claim development.

The areas along Highways 90 and 141 have long been important travel routes to Grand Junction and eastern Utah. The highways are comparatively lightly traveled, but are extremely important to the region. These areas also serve as utility corridors.

All of these activities have left their mark on wildlife, soils, water quality and vegetation on public lands in the East Paradox unit. Many of these activities predated the BLM, and others have taken place early in the BLM's development as a land management agency. While the BLM has long had a mission of reducing livestock grazing conflicts, other aspects of the agency's mission have evolved over the years. Management has broadened to include recreation, wildlife habitat, lands and realty actions, among others. Additionally, BLM's direction and emphasis have changed as the science of land management has advanced and Congress and the Administrative branch of government have added new laws and regulations. Colorado's Standards for Public Land Health reflect just one of the many refinements in direction that BLM has undergone.

This history has implications for land health and the BLM's ability to bring about changes. Many of the land health problems in the East Paradox unit are due to the legacy of heavy use and degradation caused many years ago. Other health problems are associated with exotic weeds which once established are extremely difficult to control. Some problems are associated with uses over which BLM has little or no control, such as the water rights system overseen by the State of Colorado. In other cases BLM has limited ability to change practices for some uses which are permitted but long-standing--such as the highway Rights of Way (ROW). These factors provide a context for understanding conditions in the East Paradox unit, and in turn will shape the actions the BLM chooses to pursue to improve land health.

Adaptive Management Review

Previous Land Health Assessment: Determinations

The last East Paradox Land Health Assessment (LHA) took place in 1999-2000, with the following results:

Table 3. 1999 East Paradox LHA Determinations. Figures shown in blue to avoid confusion with current LHA results.

Acres Meeting Standards 1, 3,& 4	Acres Not Meeting Standards 1,3,&4	Acres Unknown 1,3,&4		
69,830 (89%)	8,198 (11%)	40 (<1%)		
Stream Miles Meeting Standards 2&5	Stream Miles Not Meeting Stand-ards 2&5	Stream Miles Unknown 2&5		
46.1 (95%)	2.6 (5%)	0 (0%)		
Standard	Meeting	Meeting but Problem Areas	Not Meeting	Unknown
Standard 1-Soils (acres)	70,354 (90%)	6,116 (8%)	1,559 (2%)	40 (<1%)
Standard 2-Riparian (miles)	11.4 (36%)	17.4 (56%)	2.6 (8%)	0 (0%)
Standard 3-Healthy Communities (acres)	61,743 (79%)	8,087 (10%)	8,199 (11%)	40 (<1%)
Standard 4-T&E Species (acres)	78,068 (100%)	0 (0%)	0 (0%)	0 (0%)
Standard 5-Water Quality (miles)	11.8 (24%)	36.9 (76%)	0 (0%)	0 (0%)

The most notable land health problems observed included :

- **Standard 1:** Lack of protective groundcover on the soil surface, particularly in annual plant-dominated areas of Paradox Valley. This may be contributing to gullying problems.
- **Standard 2:** Some areas dominated by tamarisk and channel entrenchment, particularly along the Dolores River.
- **Standard 3:** Dominance of areas by exotic annual plants, lack of adequate perennial forbs and cool season grasses. Some areas had poor seral stage diversity, which is affecting habitat quality and winter range quality for big game. Declines in the mule deer population, increases in the elk population, and declines in populations of some neo-tropical songbird species.
- **Standard 4:** No problems were noted.
- **Standard 5:** Some drainages were located in areas with low groundcover, increasing sediment production.

Previous Land Health Assessment: Recommendations and Follow-up Management

Management in the unit has not been specifically driven by the LHA results. However, many actions that have taken place in the LHA unit over the past ten years have been consistent with some of the recommendations. The recommendations listed below were made in the last LHA report. Blue type indicates where follow-up actions have taken place.

Standard 1:

- 1) Assess identified gullied systems and prepare corrective actions.
- 2) Reduce bare ground and increase perennial basal cover in problem areas by treating vegetation and/or preserving existing cryptogam cover.
- 3) Adjust livestock grazing to leave more plant litter. **Livestock grazing permits have been renewed with terms and conditions which limit forage utilization to 50% of palatable species.**
- 4) Improve road management following completion of road inventory for unit. **Roads on Sawtooth Ridge were inventoried. Other likely routes have been digitized off of aerial photography.**
- 5) Prepare map of high risk soils to help identify road and vegetation treatment priority areas using the soil k factor >0.2, bare soil >50%, and slopes >4%.

Fragile soils were mapped as part of the Resource Management Plan process.

- 6) Increase perennial basal cover in annual dominated communities through experimenting with restoration approaches, then widely applying successful approaches.

Standard 2:

- 1) Control tamarisk with cutting and herbicide. **Tamarisk have been removed (cut and treated with herbicide) from much of the San Miguel River and Dry Creek through a partnership between The Nature Conservancy and BLM. UFO arranged for a tamarisk beetle release along the Dolores River in 2007, and the beetles have since spread along the entire river within the UFO, apparently killing much of the above ground portions. We have also been involved with the Dolores River Restoration Action Plan and Partnership since 2009, which is directed at reducing tamarisk along the river. A series of riparian restoration pilot plots has been established along the Dolores River in 2011 to determine effective ways to restore native riparian vegetation.**
- 2) Establish monitoring studies to evaluate grazing impacts along the riparian areas. **Greenline transects have been established to monitor channel and riparian condition and trend.**
- 3) Evaluate impacts of road encroachment and maintenance along Lasal Creek and River Road.

Standard 3:

- 1) Improve perennial grass, forb, and cool season cover by treating vegetation and altering grazing management. **Livestock grazing permits have been renewed with terms and conditions which limit forage utilization to 50% of palatable species, limit duration of growing season use to 15 days, and avoid spring and fall grazing of same areas in same years.**
- 2) Convert cheatgrass dominated flats through experimenting with restoration approaches.
- 3) Complete road and weed inventory for unit to provide data for improving road management and identify roads suitable for reclamation. **Roads on Sawtooth Ridge were inventoried. Other likely routes have been digitized off of aerial photography.**
- 4) Complete noxious weed inventory and treat infestations. **A portion of the area was inventoried in the mid-2000s with the help of the Uncompahgre Plateau Partnership. Weed treatment in this unit has been mainly limited to the major county roads and state highway Rights of Way. A large grant was obtained from UMETCO by Montrose County to treat weeds on BLM around the uranium mining areas. This grant helped build the county's weed management capacity on the west end of Montrose County, but has not resulted in much treatment in the East Paradox unit.**
- 5) Reseed all fires, vegetation treatments, or soil disturbing activities in areas where exotic species are present. **There have only been 2 small burns in the last ten years. The larger burn was seeded.**
- 6) Improve shrub vigor by treating portions of low vigor shrub stands with a rollerchopper to chop up to 50% of area within a stand. Seed at the same time with native grass/forb/shrub mix.
- 7) Avoid potential management-caused barriers to wildlife movements.
- 8) Improve the landscape mosaic to be compatible with the Fire Management Plan landscape objec-

tives.

9) Adjust grazing to allow for the accumulation of fine fuels in burnable areas in some years. **Livestock grazing permits have been renewed with terms and conditions which instruct the operator and Range Management Specialist to seek opportunities to rest areas to allow fine fuels to accumulate.**

Standard 4:

No recommendations were made

Standard 5:

1) Monitor for fecal coliform bacteria. **Fecal coliform levels were tested for all stream segments in the unit during 2003 and 2004.**

2) Improve watershed condition where groundcover is too low. **Livestock grazing permits have been renewed with terms and conditions which limit forage utilization to 50% of palatable species.**

3) Assess identified gullied systems as to their stage of development and causal factors, and prepare corrective actions.

Other Actions Which Relate to Land Health

Numerous other activities related to land health have occurred in the East Paradox unit in the past ten years. These are listed under the relevant subactivities as follows:

Range Management: **Many existing reservoirs have been cleaned and/or repaired. New fences and cattle guards have been constructed and existing fences have been maintained on an annual basis. New range improvement projects and the rehabilitation of existing projects have facilitated the implementation of new and modified grazing systems in the LHA area.**

Soil, Water and Air: **Soil temperatures were measured in Paradox Valley for several years to help determine variability in timing of spring green up of grasses in order to improve our understanding of impacts of late winter grazing on perennial plants. Water quality sampling was conducted to assess Total Recoverable Iron concentrations on the Dolores River to assist the State in making a determination on whether to remove it from the impaired waters 303d list. Construction is underway on the CC ditch diversion structure upstream of the East Paradox unit to improve fish passage, boater safety and stream health.**

Vegetation: **The Colorado Natural Heritage Program inventoried rare plant and vegetation communities in Western Montrose County, including the East Paradox LHA unit. Recommendations were made for protecting certain community types and areas.**

Riparian: **Wild and Scenic River Eligibility and Suitability determinations have been carried out for the streams and rivers in this unit. Instream flows were established along the lower San Miguel River which will retain 300cfs in the river during the summer months. This will help sustain the riparian community.**

Lessons Learned from Last 10 Years of Management

We can draw the following conclusions about land health and related management within the UFO:

- A complete revision of the LHA process was needed after the entire UFO area was assessed. The revision needed to incorporate elements of repeatability, efficiency, quantitative measures, and a way to assess small but significant disturbances on the landscape. The process needed to be better integrated into UFO's other business practices.
- The initial LHA helped support many of the activities that were already ongoing, but did not drive major management changes or generate many projects with the primary objective of improving land health. With the exception of the Grazing Permit Renewal, most projects which have been focused on land health have not arisen directly from the LHA.
- Realty, minerals and recreation activities only interfaced with land health through the NEPA process, during analysis of impacts.
- The UFO has increased its capacity to deal with some major land health issues such as weeds. This was partly in response to the LHAs providing growing evidence of the scope of the weed problem.
- The UFO does not have good mechanisms to collect some types of data needed to make well-founded determinations for some standards, particularly regarding wildlife populations.

The statements below are based on findings from the 2010-2011 East Paradox LHA (see following sections for details) and comparisons with the 1999-2000 LHA.

- While current LHA findings indicate that the total acreage of lands meeting standards has increased over the last ten years, some of this change can be attributed to differences in mapping and data collection methods. Trend summaries included in the Determinations Section provide more accurate information on whether or not the various types of land health problems are improving. This information will be strengthened over time with repeat readings of the permanent transects.
- Many of the same sorts of land health problems as noted in the first LHA are still occurring in the same general locations on the land, with notable exceptions being:
 - ◊ Soil problems appear to have declined from not meeting to meeting with problems in the central part of Paradox Valley.
 - ◊ Conditions along Dry Creek have improved from not meeting to meeting Standard 2, in part due to removal of most of the tamarisk from the stream.
 - ◊ Reductions in areas not meeting Standard 3, but increases in areas meeting with problems, mostly due to poor herbaceous understory in pinyon-juniper vegetation.
 - ◊ More in depth analysis of Standard 4 (Threatened, Endangered and Sensitive Species) has led to dramatically increased acreage not meeting or having problems with Land Health Standards, and probably does not indicate worsening conditions on an acre by acre basis. The Standard 4 assessment from 1999-2000 was minimal due to lack of data.
 - ◊ Conditions improved for Standard 5, largely due to reduced concerns about bare soil.
- There is evidence that some of the assumptions about land uses, land management and land health may have been faulty, for example that dormant season grazing would improve vegetation trend, or that county and contractor efforts would be sufficient to control noxious weeds on BLM in the East Paradox area.
- BLM has had difficulty implementing some of the recommendations from the original LHA largely because of other, higher priorities and funding constraints.



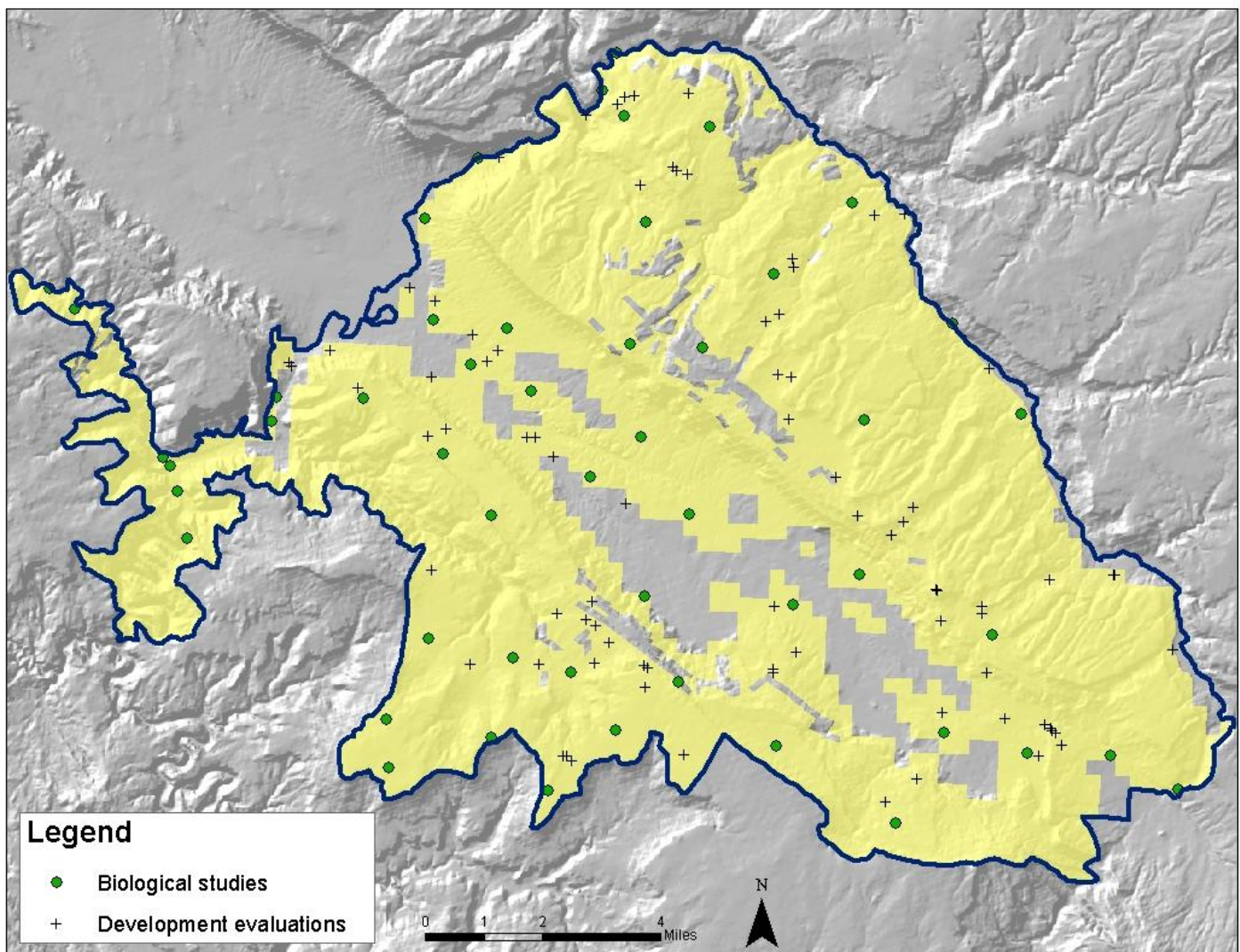
Some past land management projects in the East Paradox Area did not work as planned. These Paradox Valley seeding projects from the 1970s-1980s have been overtaken by nonnative annual weeds.

Land Health Assessment Methodology

1. Existing permanent monitoring studies for uplands and riparian areas were selected to represent each of the following categories: allotments, important vegetation types, vegetation treatments, special management areas, and former land health status. These were used as the basis for the biological studies.
2. New biological study locations were identified to ensure all important categories were represented. These supplemented the existing biological studies. Between existing and new studies, a total of 42 upland studies and 9 riparian studies were selected (see Figure 3.)
3. A representative selection of each development type was selected for site visits. A list of 90 sites to visit was drawn up (see Figure 3).
4. Biological upland studies were read in April, May and September of 2010 by a wide range of biological specialists. Both upland and riparian/water-based studies were included. Upland field work involved collecting soil surface groundcover data using 90 point-intercepts arrayed along a 100' transect. Plant canopy cover data was collected by plant species using 15 20 x 50cm frames for herbaceous vegetation and 15 2.5 x 6' frames for woody species cover along the same 100' transect. Daubenmire cover classifications were used to estimate canopy cover in order to reduce reader error. Plant species frequency (presence/absence) was also read in the larger plot frames to capture information on less common species. Browse shrub condition was evaluated by using a nearest individual sampling procedure for 25 shrubs along a paced transect. Shrub species, age class, hedge class and vigor were documented for each shrub. Tree stands were also characterized using a nearest neighbor approach to sample 25 trees for age class, species, diameter at stump height, vigor, and average distance between trees. Land health characterization forms were filled out at each study site for environmental, soil erosion, and vegetation characteristics. Each site was also evaluated for evidence of any type of human-related or notable natural influence, and photos were taken at each study site. Wildlife evidence forms were filled out at each study site.
5. Biological riparian and water-based studies were read in July and September, and followed a modified Greenline methodology with a cross section transect and transects that were parallel to the channel. Line intercept data was collected for each plant association encountered along each transect. Lotic Proper Functioning Condition forms were also filled out for each site. Riparian studies included evaluation of the site for evidence of any type of visible human-related or unexpected natural influence. Photos were taken at each study site. Wildlife evidence forms were filled out as well. Water chemistry samples and macroinvertebrate samples were collected at some sites and sent to labs for processing. Data from previous years' water chemistry and macroinvertebrate sampling was also utilized, along with road density data.
6. Developments were evaluated in May and October of 2010 by small interdisciplinary teams that had representatives from Biological, Recreation and Lands and Minerals staff. Standardized development forms that required examination of development condition, compliance, and effects on land health indicators (outside the immediate footprint of the development) were filled out.
7. Data was entered into MSAccess databases for developments, riparian, vegetation study, and wildlife observations, and into ARCGIS. Digital photos were organized and linked to the data points in GIS.
8. Data from the biological transects was summarized by individual study, and reported on the biological study summary sheets (See Appendix B and C.)
9. Data from the development forms was summarized by development type on individual summary sheets (see Appendix D.)
10. The interdisciplinary biological team met to make land health determinations for each study site. Determinations were based on comparing the data for a site versus what would be expected for that same ecological site (from averages developed with data from 10 years of prior LHA data). Indicators showing notable problems (departures from the average values in a negative direction), or notable positives (positive departures from average values) were also identified. Expert knowledge and discussions tempered these decisions. Where there was preexisting study data, trends were also determined by the interdisciplinary bio-team (see Determinations section.)

11. The full interdisciplinary team met to evaluate the development results. The group categorized each development type based on its impacts to land health indicators, and abundance and distribution in the East Paradox Landscape Unit. Potential remedies to land health problems were also discussed. Results of these discussions and rankings are included in Development Analysis sections throughout the document.
12. Determination data from each biological study site was extrapolated to similar areas within an allotment and vegetation type using GIS. Acreages for Land Health Determinations were calculated and maps showing Land Health determinations were generated.
13. Land health indicator positives, problems and trend data were analyzed to identify patterns and locations of specific types of problems on the landscape (see Determinations Section and Appendix A.)
14. Causal factors were identified by comparing the evidence of human-related or notable natural influences between sites that were meeting health standards versus those which were determined to have land health problems. Developments were analyzed to determine where there was overlap between areas with Land Health problems and development types found to have concerns with related indicators. (see Appendix A.)
15. The interdisciplinary team met to identify specific and general remedies for the East Paradox unit. These remedies were directly tied to land health indicators which had problems (see Remedies section).

Figure 3. Map of biological study and development evaluation locations.



LAND HEALTH DETERMINATIONS— OVERVIEW

Definition: Land Health Determinations are formal ratings of public land health. Lands are rated as meeting or not meeting each of the 5 Land Health Standards based on an evaluation of specific indicators for each standard. Lands that meet standards are further subdivided into lands meeting and lands meeting with problems. Standard 1 covers soil health, Standard 2 deals with riparian health, Standard 3 relates to healthy plant and animal communities, Standard 4 involves healthy special status species and habitats, and Standard 5 deals with water quality. If an area fails to meet one or more of the 5 Standards, it is categorized as not meeting Health Standards. Developments include site specific authorizations, user created sites, and constructed features which have the potential to impact land health indicators.

Summary of Land Health Determinations for the East Paradox Landscape Unit

Acreage figures are shown for each Land Health category for each standard. Percentage figures for Standard 2 and Standard 5 show the land health determinations as a proportion of the total riparian and stream channel area.

	Lands and Streams Meeting (acres / % of unit)	Lands and Streams Meeting with Problems (acres / % of unit)	Lands and Streams Not Meeting (acres / % of unit)	Not Evaluated/ Not Applicable (acres / % of unit)
All Standards	49,615 / 62%	25,718 / 32%	3,123 / 4%	1,347 / 2%
Standard 1	70,585 / 89%	6,995 / 9%	0 / 0%	2,224 / 2%
Standard 2	388 / 41%	489 / 51 %	0 / 0%	80 / 8%
Standard 3	49,971 / 63%	24,486 / 31%	3,123 / 4%	2,224 / 2%
Standard 4	50,359 / 63%	24,975 / 31%	3,123 / 4%	1,347 / 2%
Standard 5	725 / 76%	152 / 16%	0 / 0%	80 / 8%

Explanation of Approach: Land Health Determinations are used to identify the nature and location of land health conditions on the ground. Determinations are based on data from biological studies which are located at representative “undeveloped” sites across the landscape unit and extrapolated to larger areas. Determinations are therefore general in nature and give a picture of what is likely in a given area, although conditions at any particular site may vary. To better clarify our general picture of land health conditions, data is interpreted and issues are identified in terms of regions (listed as grazing allotments), vegetation types and treatments, special management areas, and land health status from the 1999 LHA. Determination acreages, maps and highlighted favorable outcomes, general concerns and trends are shown for each Land Health Standard on the following pages (see Appendix A for the complete evaluations.)

The Development Analysis sections on the following pages provide additional analysis of developments in relation to land health. These are included to supplement to the Determinations for each Land Health Standard. The goal is to understand likely impacts from a given type of development on nearby land health indicators. The Development Analysis is based on a sample of the different types of developments or authorizations found in the East Paradox unit and compiled for each type of development (see box at right and Appendix A and D for details.)

Development Types Assessed

(documented abundance and landscape level distribution of each type in in East Paradox Unit is shown in parentheses, see Appendix A and D for details)

Abandoned mines (226-high)

BLM roads (588 miles-high)

Campsites (4-low)

Cattleguards (10-low)

Communication sites (2-low)

Corrals (2-low)

Developed recreation sites (2-low)

Exclosures (3-low)

Fences (11-low)

Gas pipeline ROWs (1-low)

Gas well pads (4-low)

Active mines-Uranium (15-low)

Monitoring stations (3-low)

Power ROWs (55 miles-moderate)

Stock ponds (56-moderate)

Road ROWs (187 miles-moderate)

Spring developments (2-low)

Stock trails (1-low)

Telephone ROW (33 miles-low)

Uranium exploration disturbances

(unknown mileage-high based on review of aerial imagery)

STANDARD 1 SOILS

Definition: To meet Standard 1, upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

Note: the following conclusions are drawn from detailed Land Health tables in Appendix A1.

Favorable Outcomes

- **Erosion** does not appear at unnaturally high levels across many parts of the LHA unit:
 - * **Active gullies**-are largely absent.
 - * **Flowpaths**-are minimal in salt-desert vegetation.
 - * **Soil pedestals**-are minimal in salt-desert vegetation and Dolores Canyon and Lasal Creek allotments, interseed treatments, and the WSA.
- **Protective groundcover** in the following areas is generally better than typically found in the UFO; trend data is also included:
 - * **Bare soil**-is minimal in salt-desert vegetation, Houser and Lasal Creek Allotments, the WSA and old interseed treatments. Overall improving trends in Davis Mesa, East Paradox, Lasal Creek and Lavender allotments, salt-desert vegetation, old interseeds and plow/seed treatments, and the WSA.
 - * **Plant basal cover**-is at high levels in salt-desert vegetation, Lasal Creek, Sawtooth and Lavender allotments, old brushbeat treatments, and the WSA. Overall improving trends in Davis Mesa, East Paradox, Lavender and Sawtooth allotments, salt-desert vegetation, old plow/seeds and untreated areas.
 - * **Plant Litter**-is at high but appropriate levels in Davis Mesa and Houser Allotments, and in areas not meeting Standards from the 1999 LHA. Overall increasing litter on Davis Mesa allotment, old brushbeat, interseed and Plow/seed treatments, and areas not meeting Standards from the 1999 LHA.

General Concerns

- Old interseed treatments were the only category tied to unnaturally high erosion levels, as indicated by **active gullies**.
- **Protective groundcover and soil surface conditions** in the following areas are generally worse than typically found in the UFO; trend data is also included:
 - * **Bare soil**-is at high levels in Dolores Canyon Allotment and old plow/seed treatments.

Overall declining trends in Dolores Canyon allotment.

- * **Plant basal cover**-is at low levels in Dolores Canyon and Houser Allotments, and old interseed treatments. Overall declining trends in Houser allotment and old interseed treatments.
- * **Plant litter**-Overall decreasing litter in Lavender and Sawtooth allotments.

Development Analysis

The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. The following types of developments showed degradation to adjacent soil indicators at levels worth noting:

- * **Water erosion**-was sometimes increased at abandoned mine sites, BLM roads, communication sites, gas pipeline ROWs, gas well pads, and old uranium exploration activities.
- * **Wind erosion**-was not a concern with any development.
- * **Groundcover**-was sometimes reduced at grazing exclosures, gas pipeline ROW, gas well pad, active uranium mines, spring developments, and old uranium exploration activities.

Indicators:

Gullies: Alter site hydrology and remove soil

Excessive Flowpaths: Erode soil and deprive site of water needed for plant growth

Pedestal Formation: Indicates loss of surface soil, loss of site productivity and potential

Excessive Bare Soil: Indicates site is vulnerable to the erosive forces of water and wind

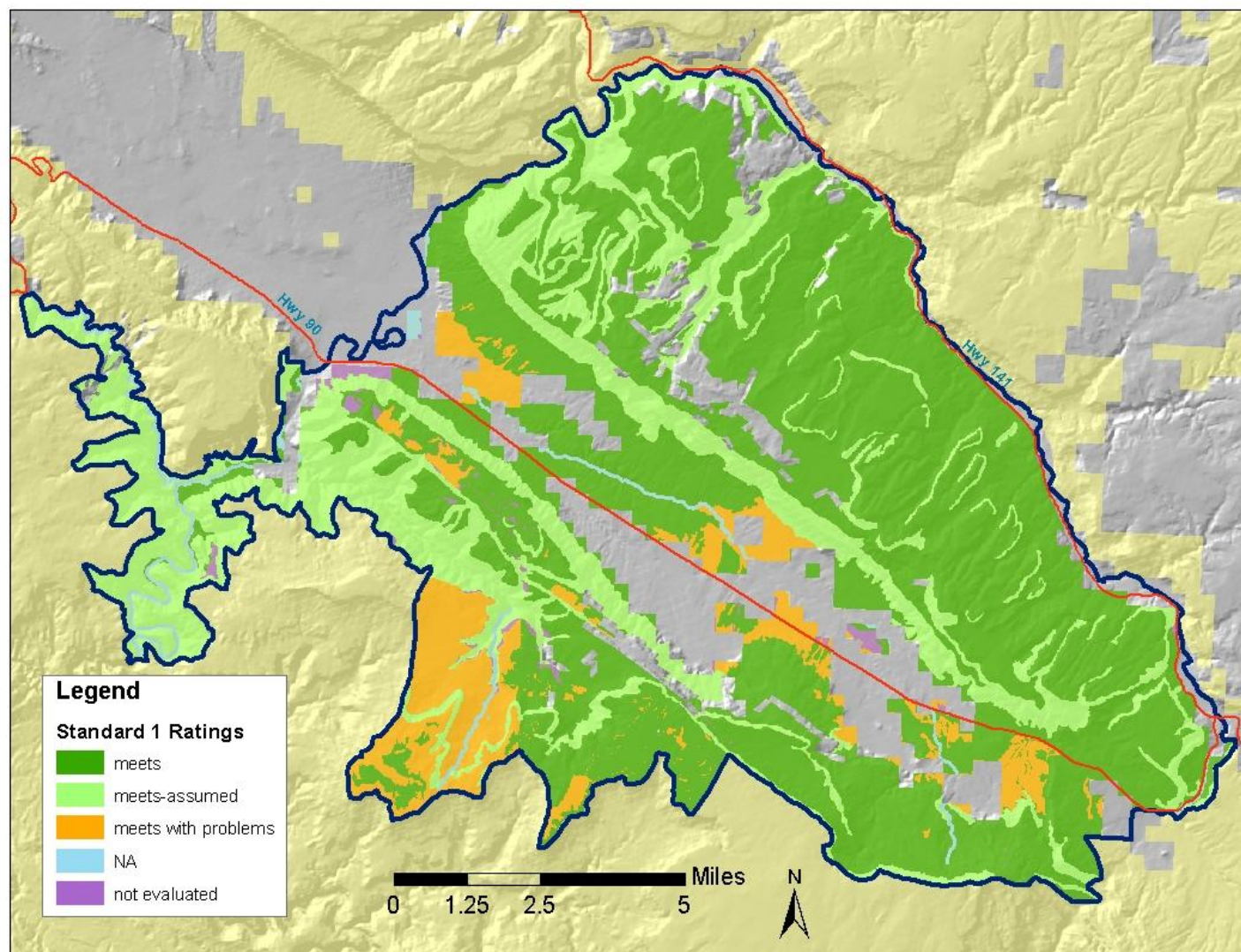
Low Plant Basal Cover: Increases the risk of soil erosion, shows that site is not producing vegetation at full potential

Low Cryptogam Cover: May increase risk of soil erosion, reduce soil nutrient levels

Inappropriate Plant Litter: May change soil carbon dynamics and reduce levels of soil protection

LAND HEALTH DETERMINATIONS FOR STANDARD 1

Figure 4. Standard 1 Land Health Determinations map.



Standard 1 Determinations Table, with acreages and percentages of lands falling into each Land Health rating category for Standard 1. Trends are also reported as a percentage of each Land Health rating category.

	Standard 1 Determinations (acres / % of unit)					
	Meets or Exceeds	Meets-Assumed	Meets with Problems	Not Meeting	Not Evaluated	Not Upland
Overall Rating	48,475 / 61%	22,110 / 28%	6,995 / 9%	0 / 0%	766 / 1%	1,458 / 1%
Trends within each Land Health Category (% of acres in category)						
Soil Trend Up	19%	unknown	4%	0%	unknown	N/A
Soil Trend Static	36%	unknown	22%	0%	unknown	N/A
Soil Trend Down	19%	unknown	59%	0%	unknown	N/A
Undetermined	26%	unknown	16%	0%	unknown	N/A

STANDARD 2 RIPARIAN

Definition: To meet Standard 2, riparian systems function properly and have the ability to recover from major disturbances such as fire and 100 year floods. Riparian vegetation captures sediment, and provides forage, habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water slowly.

Note: the following conclusions are drawn from detailed Land Health tables in Appendix A2.

Favorable Outcomes

- **Most Riparian Proper Functioning Condition** indicators are meeting basic levels of function.
- **Riparian vegetation** conditions in the following areas are generally better than typically found in the UFO; trend data is also included:
 - * **Wetland obligate species**-at high levels in Lasal Creek allotment, areas not meeting Standards from 1999 LHA, and the WSA. Obligate species generally increased in Dolores Canyon, Mesa Creek and Sawtooth allotments, and in all lands regardless of 1999 LHA health determination status.
 - * **Wetland facultative species**-generally increased in Dolores Canyon and Lasal Creek allotments, and in the WSA.
 - * **Exotic species**-at lower than typical levels in Sawtooth allotment and areas not meeting Standards from 1999 LHA and the WSA. Exotics generally declined in Dolores Canyon and Mesa Creek allotments, and in lands meeting Standards from 1999 LHA.
 - * **Riparian width**-increased in Dolores Canyon and Lasal Creek allotments, and the WSA.

General Concerns

- **Some Riparian Proper Functioning Condition** indicators are partially meeting or not meeting basic levels of function in the following areas; trend data is also included:
 - * **Channel morphology**-problems with excessive stream width:depth ratios-Dolores Canyon and Mesa Creek allotments; problems with reduced sinuosity-Sawtooth allotment and areas not meeting Standards from 1999 LHA; problems with lateral instability in Mesa Creek allotment.
 - * **Riparian vegetation and age class diversity**- Dolores Canyon and Lasal Creek allotments, and the WSA.
- There are some Greenline study indicators in the following areas that are generally worse than typically found in the UFO; trend data is also included:
 - * **Wetland obligate species**-generally de-

clined in the WSA along the Dolores River.

- * **Wetland facultative species**-generally declined in Mesa Creek and Sawtooth allotments, and in areas not meeting Standards.
- * **Exotic species** amounts-Dolores Canyon, Lasal Creek and Mesa Creek allotments, lands meeting Standards from 1999 LHA, and the WSA. Exotic species are generally increasing in Lasal Creek allotment and in the WSA.
- * **Riparian width**-generally decreasing in Mesa Creek allotment.

Development Analysis

Very few developments in the LHA unit are located in riparian areas. Development effects are not reflected in the Land Health Determinations, but there were no instances of developments impacting riparian health indicators at levels sufficient to be a land health concern.

Indicators:

Vegetation: vigorous desirable or native species with diverse age classes and structure provide resilience and habitat values to the riparian system, should include facultative and obligate types to indicate presence of adequate water

Roots: plants with woody or extensive fibrous root systems can withstand high streamflows and prevent banks from eroding during floods

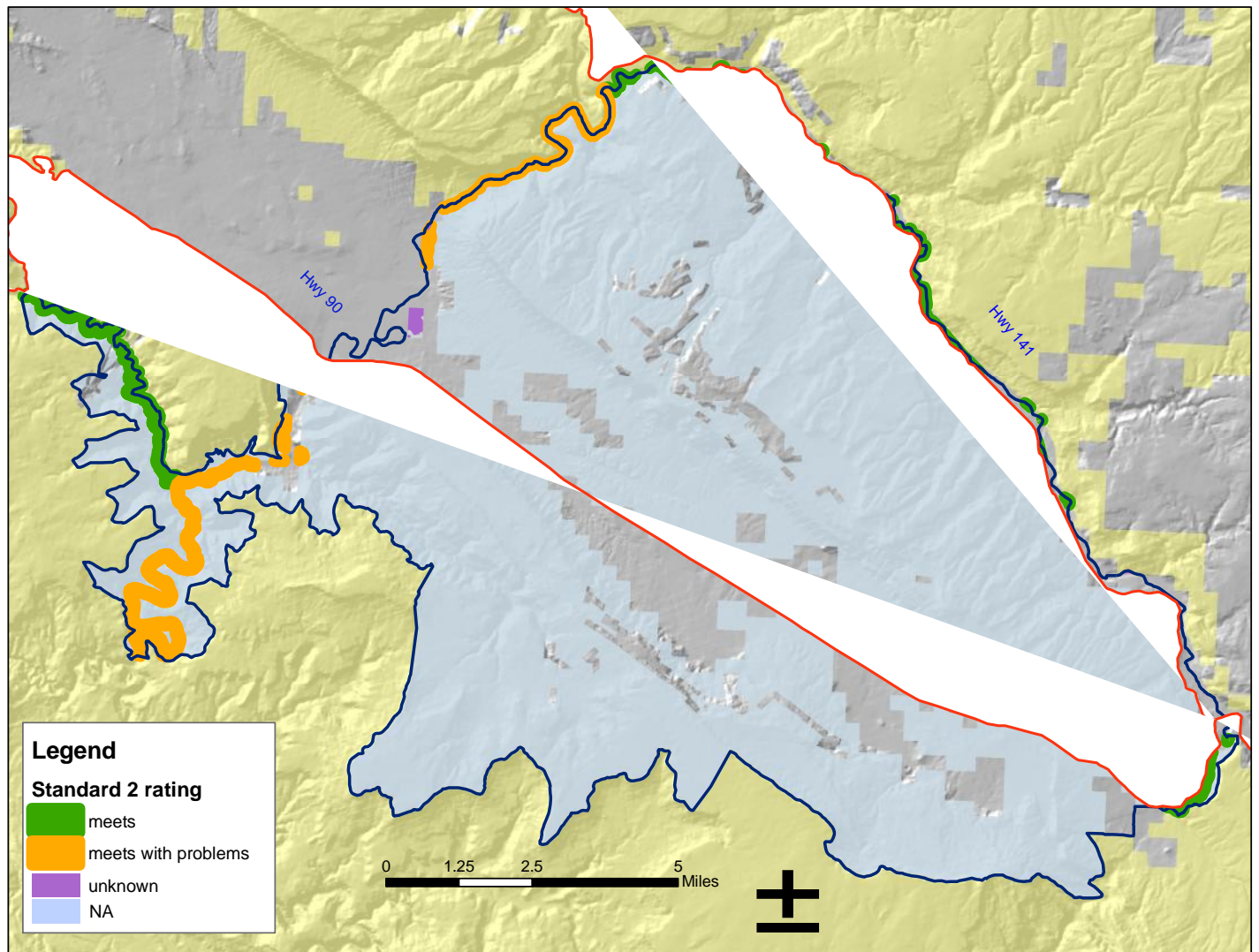
Wetted Soils: are necessary to support the riparian plant species, and are indicated by obligate or wetland plant types

Channel Morphology: needs the correct width:depth ratio, sinuosity, and rocks, logs or vegetation to dissipate erosive forces from floods. These features are also needed to accommodate the water and sediment from the watershed, otherwise the stream can shift from a stable but dynamic system to an unstable one

Channel Processes: such as regular flooding and point bar formation needed to maintain riparian vegetation and to dissipate erosive flood energy

LAND HEALTH DETERMINATIONS FOR STANDARD 2

Figure 5. Standard 2 Land Health Determinations map.



Standard 2 Determinations Table. This table shows acreages and percentages of lands falling into each Standard 2 Land Health rating. Trends are also reported as a percentage of each Land Health rating.

	Standard 2 Determinations (acres / % of riparian)				
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Not Riparian
Overall Rating	388 / 41%	489 / 51 %	0 / 0%	80 / 8%	78,849 / NA
Trends within each Land Health Category (% of acres in category)					
Riparian Trend Up	24%	8%	0%	unknown	N/A
Riparian Trend Static	42%	11%	0%	unknown	N/A
Riparian Trend Down	0%	59%	0%	unknown	N/A
Undetermined	34%	22%	0%	unknown	N/A

STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES

Definition: To meet Standard 3, healthy productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and habitat's potentials. Plants and animals are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.

Note: the following conclusions are drawn from detailed Land Health tables in Appendix A3.

Favorable Outcomes

- Plant community and habitat indicators in the following areas are generally better than typically found in the UFO; trend data is also included:
- * **Perennial cool season grass**-high existing levels in Davis Mesa and Mesa Creek allotments, old brushbeat and plow/seed treatments. Improving trend in old brushbeat treatments.
- * **Perennial warm season grass**-high levels in Lasal Creek allotment and the WSA. Improving trend in Davis Mesa, Houser, Lasal Creek and Lavender allotments, brushbeats, and the WSA.
- * **Perennial forbs**-Improving trend in Davis Mesa, Dolores Canyon and East Paradox allotments.
- * **Exotic species**-generally at lower levels in East Paradox, Houser, Lasal Creek and Sawtooth allotments, pinyon-juniper, untreated areas, and in lands meeting Standards from the 1999 LHA. Decreasing in Davis Mesa and Houser allotments.
- * **Native plant diversity**-high in Dolores Canyon allotment.
- * **Browse shrub health**-good in Davis Mesa, East Paradox, Lasal Creek and Mesa Creek allotments, salt desert shrub, old brushbeats, and plow/seed treatments, lands meeting Standards from the 1999 LHA, and the WSA.

General Concerns

- The most widespread problem in the East Paradox unit is low **perennial forb** cover.
- Plant community and habitat indicators in the following areas are generally worse than typically found in the UFO; trend data is also included:
- * **Perennial cool season grass**-low levels in Dolores Canyon, East Paradox, Lavender and Sawtooth allotments, interseeds and untreated vegetation, and areas not meeting Standards from the 1999 LHA. Levels declining in Davis Mesa (despite high existing levels), Houser, and Lavender allotments, sagebrush, and interseed and plow/seed treatments.
- * **Perennial warm season grass**-low in Dolores Canyon and Houser allotments, interseed treatments, and areas not meeting Standards from the 1999 LHA. Declining levels in Dolores Canyon, and interseed and plow/seed treatments.
- * **Perennial forbs**-low in Davis Mesa, Dolores Canyon, Houser, Lavender and Sawtooth allotments, pinyon-juniper and sagebrush, all vegetation

treatments, and lands not meeting Standards from the 1999 LHA. Declining levels in Houser and Lasal Creek allotments, and the WSA.

- * **Exotic species**-higher levels in Davis Mesa and Lavender allotments, sagebrush, all vegetation treatments, and in lands formerly not meeting Health Standards. Levels increasing in Dolores Canyon and Lavender allotments, and brushbeat and interseed treatments.
- * **Native plant diversity**-lower in Davis Mesa and Lavender, interseed and plow/seed treatments, and areas not meeting 1999 Standards.
- * **Browse shrub health**-poor in Lavender allotment.

Development Analysis

Land Health in the unit is affected by the many developments there. The Land Health Determinations are based on undeveloped areas, but the following developments occasionally degraded adjacent indicators:

- * **Native Vegetation**-sometimes reduced by grazing exclosures, gas pipeline and well pads, and stock ponds.
- * **Weeds**-sometimes increased next to abandoned mines, corrals, exclosures, well pads, stock ponds, and road ROWs.
- * **Wildlife**-sometimes exposed to hazards near communication ROWs, corrals, exclosures, gas well pads, active mines, and power and road ROWs.
- * **Connectivity**-sometimes reduced by exclosures, and road ROWs.

Indicators:

Native Plant Diversity: the parts and pieces of the natural system are present.

Cool/Warm Season Perennial Grasses: sunlight and other resources are being used effectively, also an important forage source.

Perennial Forbs: an important habitat and diversity component.

Pinyon-Juniper Invasion and Decline: these can cause changes in the understory and habitat type, and may indicate landscape level imbalances.

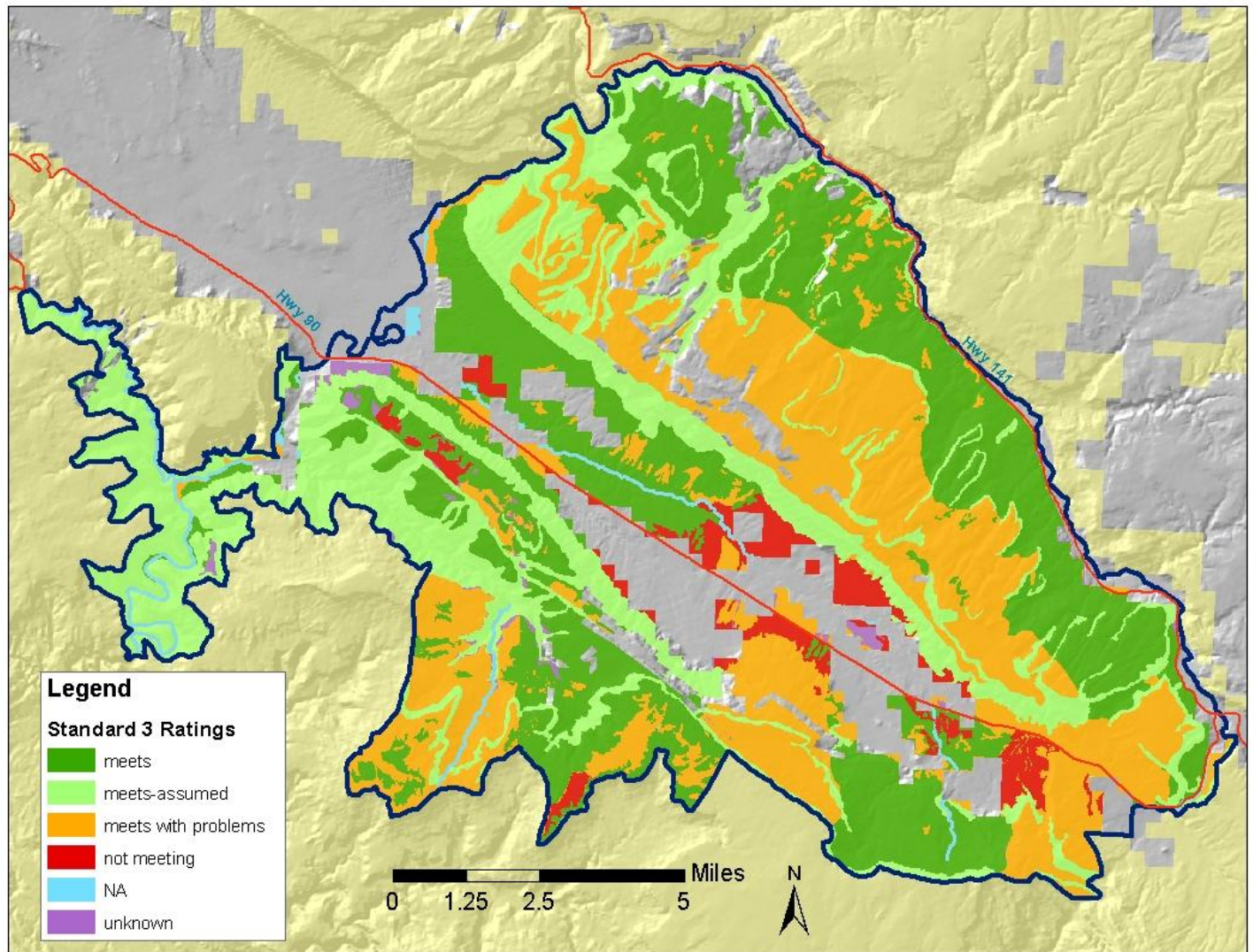
Exotic and Noxious Species: indicate loss of biodiversity, site productivity and habitat value.

Shrub Vigor and Hedging: indicates overall health and sustainability of the shrub stand.

Habitat Connectivity: allows for migration, genetic interchange, and resilience to disturbances which are important for sustaining viable populations of plant and animal species.

LAND HEALTH DETERMINATIONS FOR STANDARD 3

Figure 6. Standard 3 Land Health Determinations map.



Standard 3 Determinations Table. This table shows acreages and percentages of lands falling into each Standard 3 Land Health rating. Trends are also reported as a percentage of each Land Health rating.

	Standard 3 Determinations (acres / % of unit)					
	Meets or Exceeds	Meets-Assumed	Meets with Problems	Not Meeting	Not Evaluated	Not Upland
Overall Rating	27,861-35%	22,110-28%	24,486 / 31%	3,123 / 4%	766-1%	1,458-1%
Trends within each Land Health Category (% of acres in category)						
Plant Trend Up	42%	unknown	21%	0%	unknown	N/A
Plant Trend Static	44%	unknown	38%	17%	unknown	N/A
Plant Trend Down	0%	unknown	6%	29%	unknown	N/A
Undetermined	14%	unknown	34%	55%	unknown	N/A

STANDARD 4 SPECIAL STATUS SPECIES (TES¹)

Definition: To meet Standard 4, special status, threatened, and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.

¹TES Species— Special Status Species which includes federally threatened, endangered, proposed, and candidate species and BLM sensitive species

Note: the following conclusions are drawn from detailed Land Health tables in Appendix A4.

Favorable Outcomes

- The favorable conditions listed for Standards 2 and 3 typically translate to good habitat for TES species, unless there are specific problems that create conditions unsuitable for specialized species.
- Sensitive raptors such as peregrine falcons continue to utilize the established territories and nest sites.
- Sensitive fish species (roundtail chub, flannel-mouth sucker, and bluehead sucker) appear to be doing well.
- Burrowing owls have been observed in recent years.
- Desert bighorn sheep are continuing to maintain , although at fairly low population levels. This is primarily due to predation factors and not due to poor habitat conditions.

General Concerns

- Each of those problems listed for Standards 2 and 3 pose direct and indirect risks or impacts on TES habitats and species
- The low perennial forb cover in many areas could be a direct indicator for poor conditions and a reduction in potential for the various sensitive plant species found in the area (sandstone milkvetch, San Rafael milkvetch, Naturita milkvetch, Grand Junction milkvetch, Paradox breadroot, and Paradox Valley lupine).
- Poor forb and native grass composition in the sagebrush communities reduce the potential for possible reintroduction of Gunnison sage grouse into these historic habitats.
- Prairie dog populations are at very low numbers, probably due to plague in the past. The large amounts of bare soil in the old plow/seed treatment areas, much of which is historic prairie dog habitat, may reduce the potential for re-establishment of prairie dog populations in these areas. There is evidence that prairie dogs have also contributed to these conditions, illustrating the complex relationship between land disturbance, nonnative plants, and prairie dogs.

Development Analysis

The many developments in the LHA unit affect Land Health to some degree, but are not reflected in the Land Health Determinations. See analysis under Standard 3 for general habitat impacts from developments which may affect some TES species. While most developments surveyed had no impacts on adjacent Standard 4 indicators, the following developments had isolated incidences where they were detrimental:

- * **TES Species**-minor impacts from abandoned mines to bats at isolated sites.
- * **TES Habitat**-minor impacts from abandoned mines to bat habitat, and from BLM roads.

Indicators:

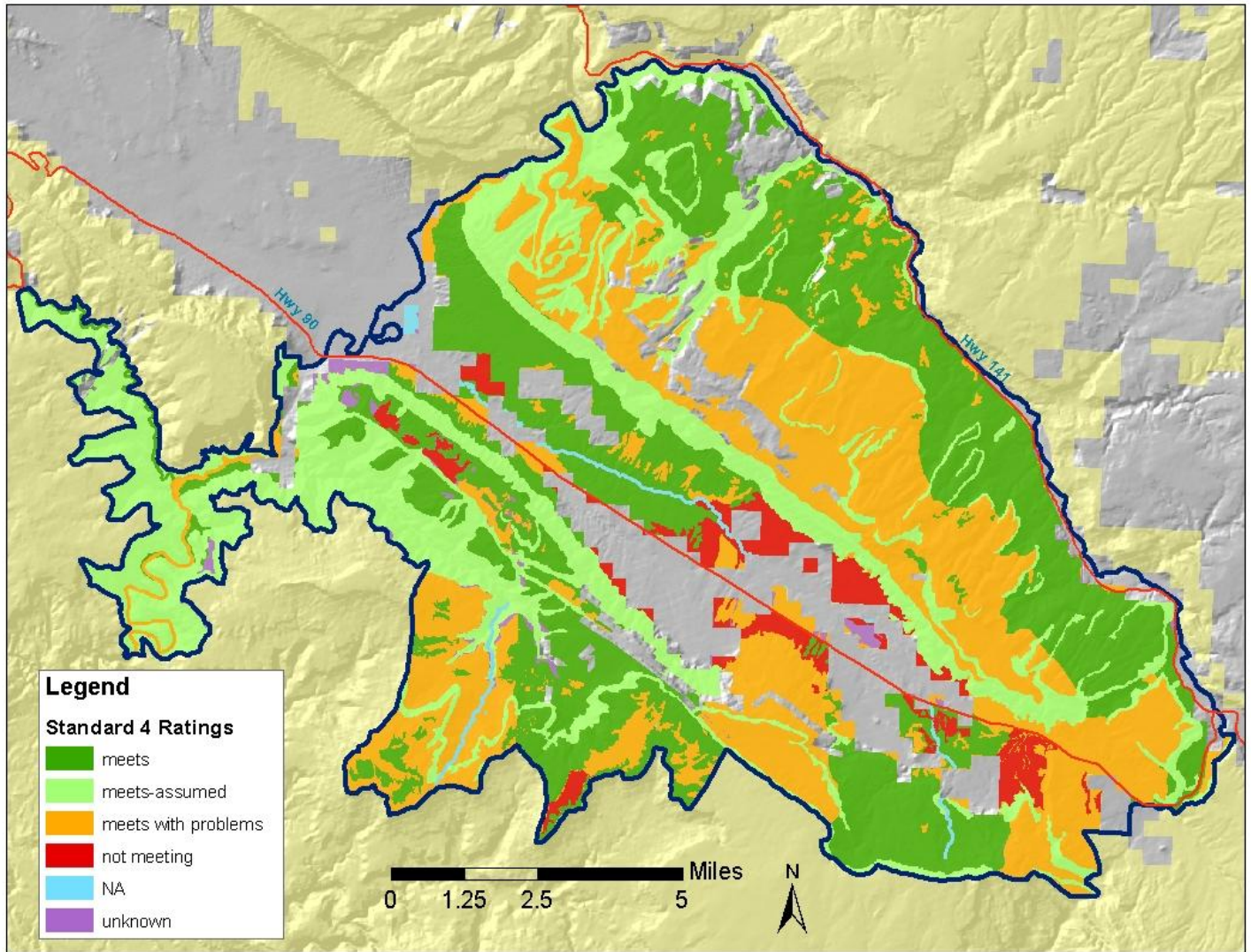
Standard 3: All the indicators listed for Standard 3 apply

Populations of Endemic and Protected Species: should be stable and increasing in suitable habitat

Suitable Habitat: should be available for recovery of endemic and protected species

LAND HEALTH DETERMINATIONS FOR STANDARD 4

Figure 7. Standard 4 Land Health Determinations map.



Standard 4 Determinations Table. This table shows acreages and percentages of lands falling into each Standard 4 Land Health rating. Trends are also reported as a percentage of each Land Health rating.

	Standard 4 Determinations (acres / % of unit)					
	Meets or Exceeds	Meets-Assumed	Meets with Problems	Not Meeting	Not Evaluated	Not TES Habitat
Overall Rating	28,249 / 35%	22,110 / 28%	24,975 / 31%	3,123 / 4%	1,348 / 2%	NA
	Trends within each Land Health Category (% of acres in category)					
TES Trend Up	10%	unknown	1%	0%	unknown	NA
TES Trend Static	41%	unknown	62%	17%	unknown	NA
TES Trend Down	34%	unknown	3%	29%	unknown	NA
Undetermined	15%	unknown	34%	54%	unknown	NA

STANDARD 5 WATER QUALITY

Definition: To meet Standard 5, the water quality of all water bodies, including groundwater where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado.

Note: the following conclusions are drawn from detailed Land Health tables in Appendix A5.

Favorable Outcomes

- **Water chemistry** data, although limited, did not indicate widespread water quality problems.
- Our **macroinvertebrate** data also did not find substantial water quality concerns.
- **Watershed groundcover** indicators in the following areas are generally better than typically found across the UFO:
 - * **Bare soil** (a surrogate for upland groundcover)-lower in parts of Dolores Canyon, Lasal Creek and Mesa Creek allotments, areas meeting Standards from the 1999 LHA, and the WSA.
 - * Watershed **road density**-very low in parts of Lasal Creek allotment, and the WSA.
 - * Two water quality samples were collected on the Dolores River to test for total recoverable iron, the only constituent on the State 303D list. Both samples were below the state standard.
 - * The Uravan Superfund site appears to be meeting containment standards.

General Concerns

- **Water chemistry** data, which is limited, is generally worse in the following areas than typically found in the UFO:
 - * **Salts**-(measured by **electrical conductivity**) -Mesa Creek allotment (Dolores River) tied to naturally occurring saline groundwater seeps.
- **Watershed groundcover** indicators in the following areas are generally worse than typically found in the UFO:
 - * **Bare soil** (a surrogate for upland groundcover)-parts of Mesa Creek and Sawtooth allotments, and areas not meeting Standards from the 1999 LHA.
 - * Watershed **road density**-parts of Sawtooth allotment and areas not meeting Standards from the 1999 LHA.
 - * Altered **sediment** distribution on the Dolores River is contributing to poor channel morphology.

Development Analysis

Very few developments in the LHA unit are located in stream channels where they might directly affect water quality, and Land Health Determinations do not take development impacts directly into account. However, some developments in the uplands can increase sediment production or produce pollutants which can work their way down into streams and rivers. The following types of developments showed impacts to adjacent water quality indicators at levels worth noting:

- * **Pollutants**-abandoned mines (spoil piles), active uranium mines
- * **Sediment**-BLM roads and the gas pipeline ROW were most often found to have sediment production concerns. The following developments were also found to occasionally cause sediment production: abandoned mines, active uranium mines, road ROWs, and past Uranium exploration activities.

Indicators:

Macroinvertebrates: appropriate populations are present; low diversity or absence of some types indicates water quality or quantity problems

Algae: appropriate levels are present; excess levels indicate water quality problems

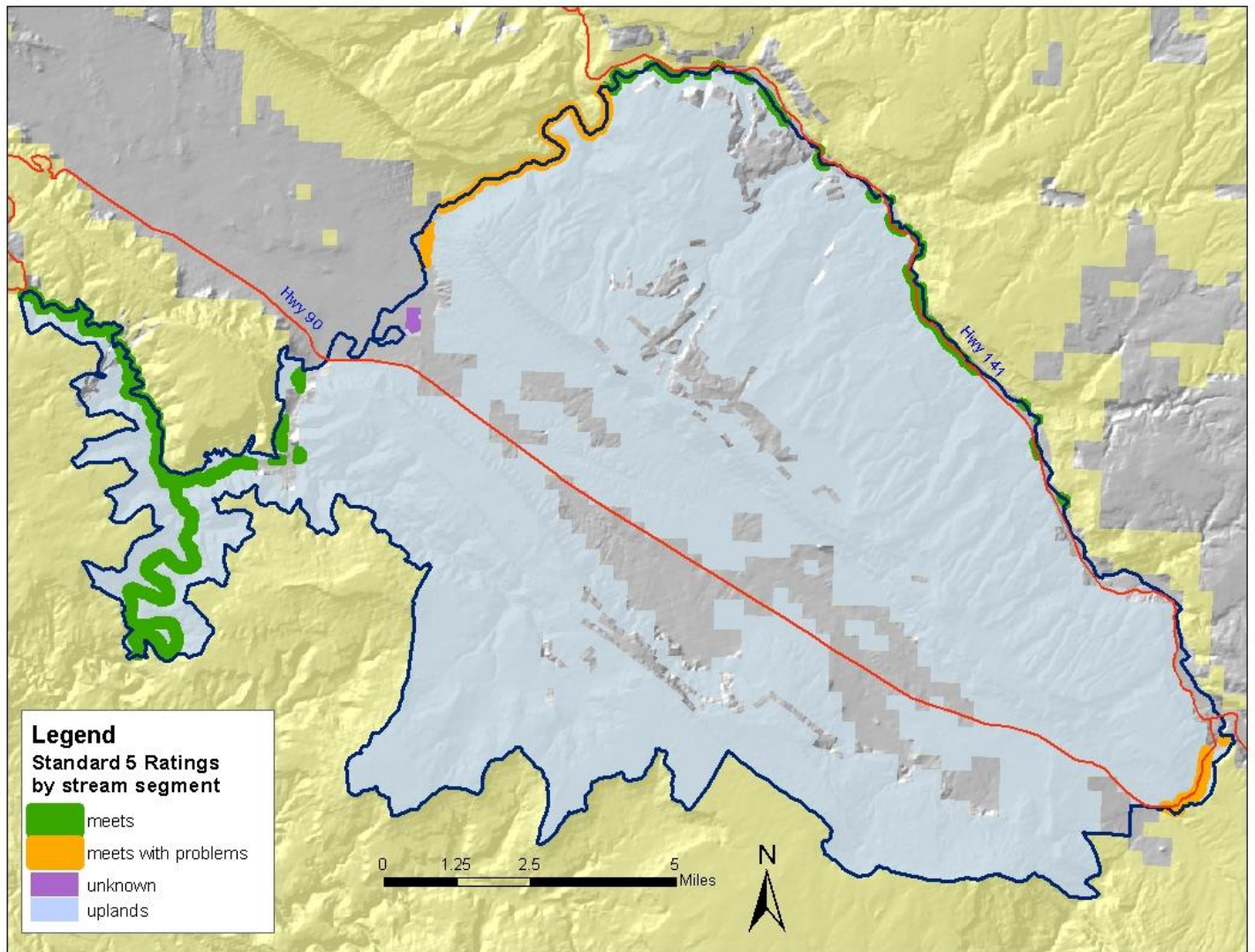
Sediment: human attributable levels should be within the amounts directed by the State of Colorado

Pollutants (Selenium, salts): human attributable levels should be within the amounts directed by the State of Colorado

Contaminants (E. coli bacteria): human attributable levels should be within the amounts directed by the State of Colorado; excess levels may pose a health hazard

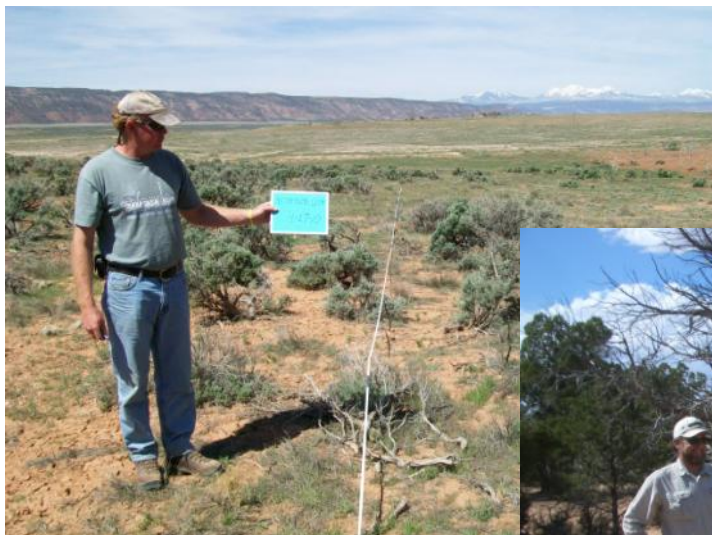
LAND HEALTH DETERMINATIONS FOR STANDARD 5

Figure 8. Standard 5 Land Health Determinations map.



Standard 5 Determinations Table. This table shows acreages and percentages of lands falling into each Standard 5 Land Health rating. Trends are also reported as a percentage of each Land Health rating.

	Standard 5 Determinations (acres / % of streams)				
	Meets or Exceeds	Meets with Problems	Not Meeting	Not Evaluated	Upland or NA
Overall Rating	725 / 75%	152 / 16%	0 / 0%	80 / 8%	78,849 / NA
Trends within each Land Health Category (% of acres in category)					
Trend Up	0%	0%	NA	unknown	N/A
Trend Static	0%	0%	NA	unknown	N/A
Trend Down	0%	0%	NA	unknown	N/A
Undetermined	100%	100%	NA	unknown	N/A



CAUSAL FACTORS—OVERVIEW

Definition: Causal factors are the conditions (i.e. activities, land uses, or natural phenomena) which are responsible for land health problems. These can occur singly or more often in combination with one another. Contributing factors are the conditions which also occur where there are health problems, but tend to modify or compound the problems instead of cause them directly.

Explanation of Approach:

An understanding of the factors which are causing land health problems is important for developing effective remedies. Causal factors are determined from an analysis of evidence observed at “undeveloped” areas where land health data was collected in the East Paradox unit.

A separate Development Analysis provides additional understanding of developments, and how these site-specific land uses influence land health at the site level, and potentially contribute to problems at the landscape level. The Development Analysis also provides information on development condition and compliance.

This dual approach provides the foundation for identifying remedies at specific locations on the landscape, and remedies that relate to UFO’s broader processes and authorizations. This page includes general findings about causal factors across all Standards, as well as information about developments and their status in the East Paradox landscape. The following pages detail causal factors for each Standard.

Causal and Contributing Factors:

The most common conditions on upland areas in the East Paradox unit are listed below in no particular order of significance. The red highlighted items are occasionally causal factors for land health problems at the landscape level. The remaining items are contributing factors:

- * Drought
- * Current livestock grazing
- * **Historic livestock grazing**
- * Mining
- * **Noxious or invasive weeds**
- * Pinyon-juniper invasion
- * BLM roads
- * Road ROWs
- * **Seral stage issues**
- * **Old vegetation treatments**
- * **Current wildlife use**
- * **Historic wildlife use**

For riparian and stream areas, these are:

- * Flood deposition
- * **Flow regulation from dams**
- * Irrigation tailwater

- * Livestock grazing
- * Mining
- * **Noxious and invasive weeds**
- * **Road encroachment**
- * **Upstream water quality**
- * **Water diversions**
- * **Watershed condition**
- * **Wildlife use**

How do Causal and Contributing Factors affect indicators?

- Soil disruption and disturbance
- Reduction of soil-protecting groundcover
- Destruction or damage to species/habitats
- Selective removal of vegetation which shifts competitive relationships
- Competition with native species for limited water, nutrients or sunlight
- Alteration of natural disturbance regimes to which native species or systems were adapted
- Reduction of resources like water or forage
- Degradation of resources so they are not fit for use by certain species

Development Analysis:

The following development types in the East Paradox Landscape are occasionally associated with impacts to land health indicators. The percentage of each type found to have issues with condition or compliance at sampled sites is shown in parentheses. We can assume that the design, implementation, or maintenance of these developments could be contributing to Land Health problems:

- * Abandoned mines (50%)
- * BLM roads (50%)
- * Communications ROWs (50%)
- * Corrals (50%)
- * Exclosures (100%)
- * Gas pipeline ROW (50%)
- * Gas well pads (100%)
- * Active mines-uranium (50%)
- * Power ROWs (22%)
- * Road ROWs (22%)
- * Stock ponds (90%)
- * Historic uranium exploration (NA)

STANDARD 1 SOILS: CAUSAL FACTORS

Definition: Generalized causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with soil health problems, and are likely influencing soil health most broadly across the East Paradox unit. Site-specific contributing factors are defined as the remaining conditions observed at significant levels (moderate or higher) at individual study sites which have soil health problems. Development analysis identifies possible links between developments and soil health.

Generalized Causal Factors

The following conditions are probably causing soil health problems in many places where they occur within the East Paradox unit (the percentages of sites with soil health problems at which each condition occurred at significant levels is also included):

- * Old vegetation treatments-70%
- * Current wildlife use-50%

Limited areas of soil problems within the unit appear to have been affected by:

- * Historic cultivation-20%

There were no conditions which appear to consistently improve soil across the landscape unit.

Site-Specific Contributing Factors

These additional conditions were found at one or more study sites with soil problems, and are contributing to the soil health status on those sites (percentages of sites with soil health problems at which each condition occurred as a contributing factor are also included):

- * Seral stage issues-50%
- * Historic wildlife use-50%
- * Historic grazing-40%
- * Drought-20%
- * Current livestock grazing-20%
- * Noxious or invasive weeds-20%
- * Fire suppression-10%
- * Mining-10%
- * Pinyon-juniper invasion-10%
- * Reservoir nearby-10%
- * Road ROWs –10%
- * Other ROWs-10%
- * BLM roads-10%

Development Analysis

Site Specific:

The following types of developments, localized use authorizations and user-created sites were sometimes found to be associated with minor land health and soil indicator concerns at the site level:

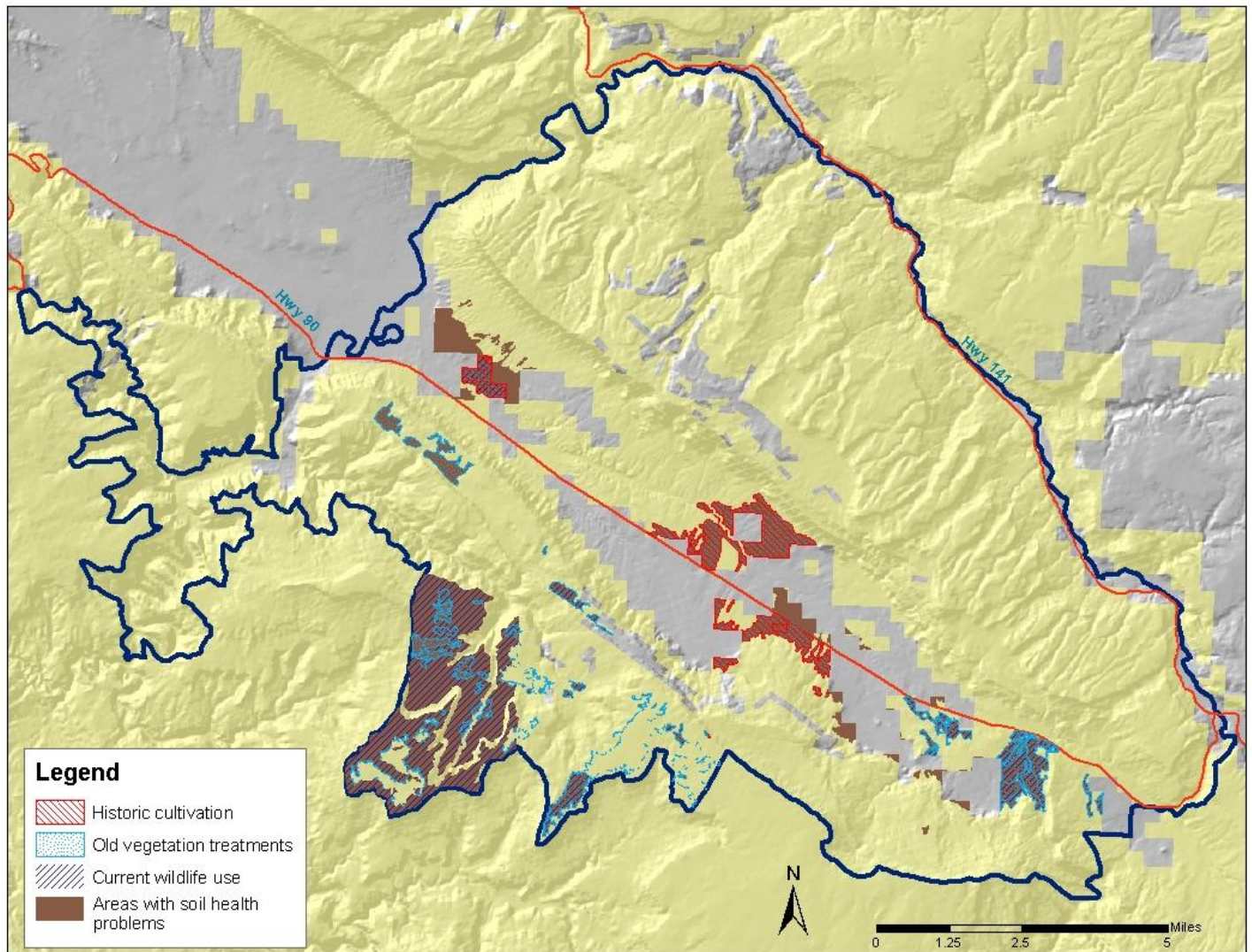
- * Abandoned mines
- * BLM roads
- * Communications sites
- * Exclosures
- * Gas pipeline ROWs
- * Gas well pads
- * Active uranium mines
- * Historic uranium exploration

Landscape Level:

The following types which occur in lands determined to have soil health problems may be contributing to those problems. Their quantities in the affected lands are also shown:

- * Abandoned mines-2 mines; closures are planned for both of these mines
- * BLM roads-68 miles
- * Exclosures-1
- * Gas pipeline ROW-1 mile
- * Historic uranium exploration-limited areas, particularly around Wild Steer Mesa and the eastern end of Paradox Valley

Figure 9. Locations of the generalized causal factors and lands with soil health concerns within the East Paradox unit.



The table below shows acreages of the Generalized Causal Factors within areas having soil health problems.

Causal Factor	Acres	Percent of Area
Historic cultivation	1,318	19%
Old vegetation treatments	3,036	43%
Current wildlife use	4,530	65%
Total Acres	6,995	100%

STANDARD 2 RIPARIAN: CAUSAL FACTORS

Definition: Generalized causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with riparian health problems, and are likely influencing riparian vegetation and channel health most broadly across the East Paradox unit. Site specific contributing factors are defined as the remaining conditions observed at significant levels (moderate or higher) at individual study sites which have riparian health problems. Development analysis identifies possible links between developments and riparian health.

Generalized Causal Factors

The following conditions are probably causing riparian health problems in many places where they occur within the East Paradox unit. (the percentages of sites with riparian health problems at which each condition occurred at significant levels is also included):

- * Flow regulation from dams-100%
- * Noxious and invasive weeds-100%
- * Water diversions-100%
- * Watershed condition-50%

There were several conditions which appeared to be associated with healthy streams across the landscape unit:

- * Flood deposition-25%
- * Wildlife use-50%

There were additional conditions which appeared more frequently where there were healthy streams, but are probably not responsible for them:

- * Road encroachment was more frequent along healthy stream segments, probably because it occurs in streams within narrow canyons, which tended to be in better health.
- * Minor upstream water quality concerns with Mancos shale and uranium milling byproducts were located in the San Miguel watershed, which had healthy streams overall.

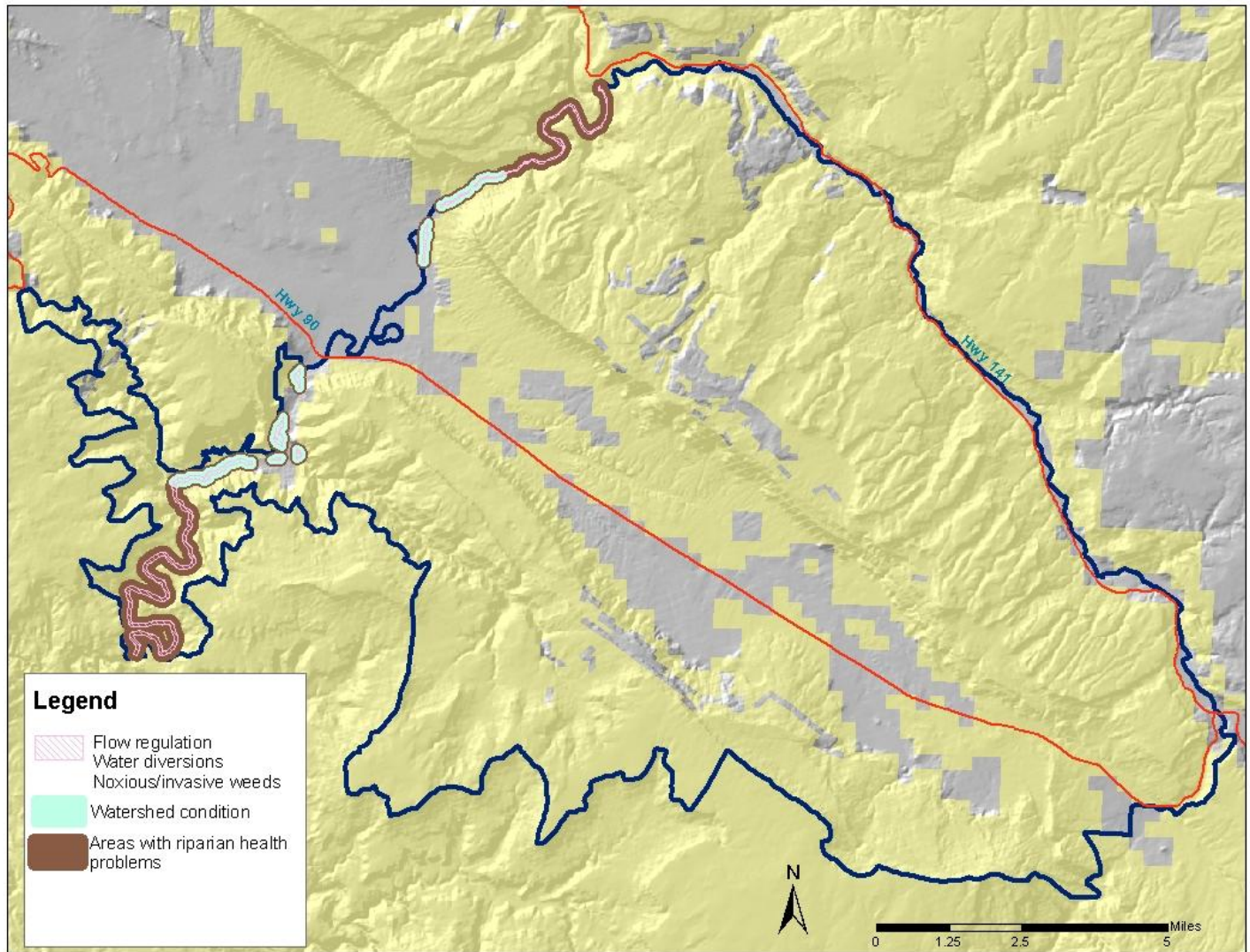
Site-Specific Contributing Factors

Naturally occurring saline groundwater seeps are contributing to problems with native riparian species and high levels of salt-tolerant tamarisk and Russian knapweed in some areas along the Dolores River.

Development Analysis

There were no developments which were found to be associated with land health and riparian indicator concerns at the site or landscape level.

Figure 10. Locations of the generalized causal factors and lands with riparian health concerns within the East Paradox unit.



The table below shows acreages of the Generalized Causal Factors within areas having riparian health problems.

Causal Factor	Acres	Percent of Riparian
Flow regulation/dams	489	100%
Water diversions	489	100%
Noxious/invasive weeds	489	100%
Watershed conditions	145	30%
Total Acres	489	100%

STANDARD 3 NATIVE COMMUNITIES: CAUSAL FACTORS

Definition: Generalized causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with native community health problems, and are likely influencing plant and animal community health most broadly across the East Paradox unit. Site specific contributing factors are defined as the remaining conditions observed at significant levels (moderate or higher) at individual study sites which have native plant and animal community health problems. Development analysis identifies possible links between developments and native plant and animal community health.

Generalized Causal Factors

The following conditions are probably causing native plant and animal community health problems in many places where they occur within the East Paradox unit (the percentages of sites with community health problems at which each condition occurred at significant levels is also included):

- * Historic livestock grazing-46%
- * Noxious and invasive weeds-38%
- * Seral stage issues-38%
- * Old vegetation treatments-33%
- * Historic wildlife use-46%

There were no activities or natural phenomena which appeared to consistently improve native plant and animal community conditions across the landscape unit.

Site-Specific Contributing Factors

The following land uses and environmental factors were found at one or more study sites with native community problems, and are contributing to the health status of those sites (percentages of sites with community health problems at which each condition occurred as a contributing factor are also included): Current wildlife use-33%

- * Drought-25%
- * Current livestock grazing-17%
- * Historic cultivation-8%
- * Mining-8%
- * Pinyon-juniper invasion-8%
- * ROWs excluding roads-8%
- * Dumping-4%
- * Erosion from uplands-4%
- * Fire-4%
- * Fire suppression-4%
- * Stock ponds nearby-4%
- * BLM roads-4%

Development Analysis

Site Specific:

The following types of developments were found to be associated with minor land health and native plant and animal community indicator concerns at the site level:

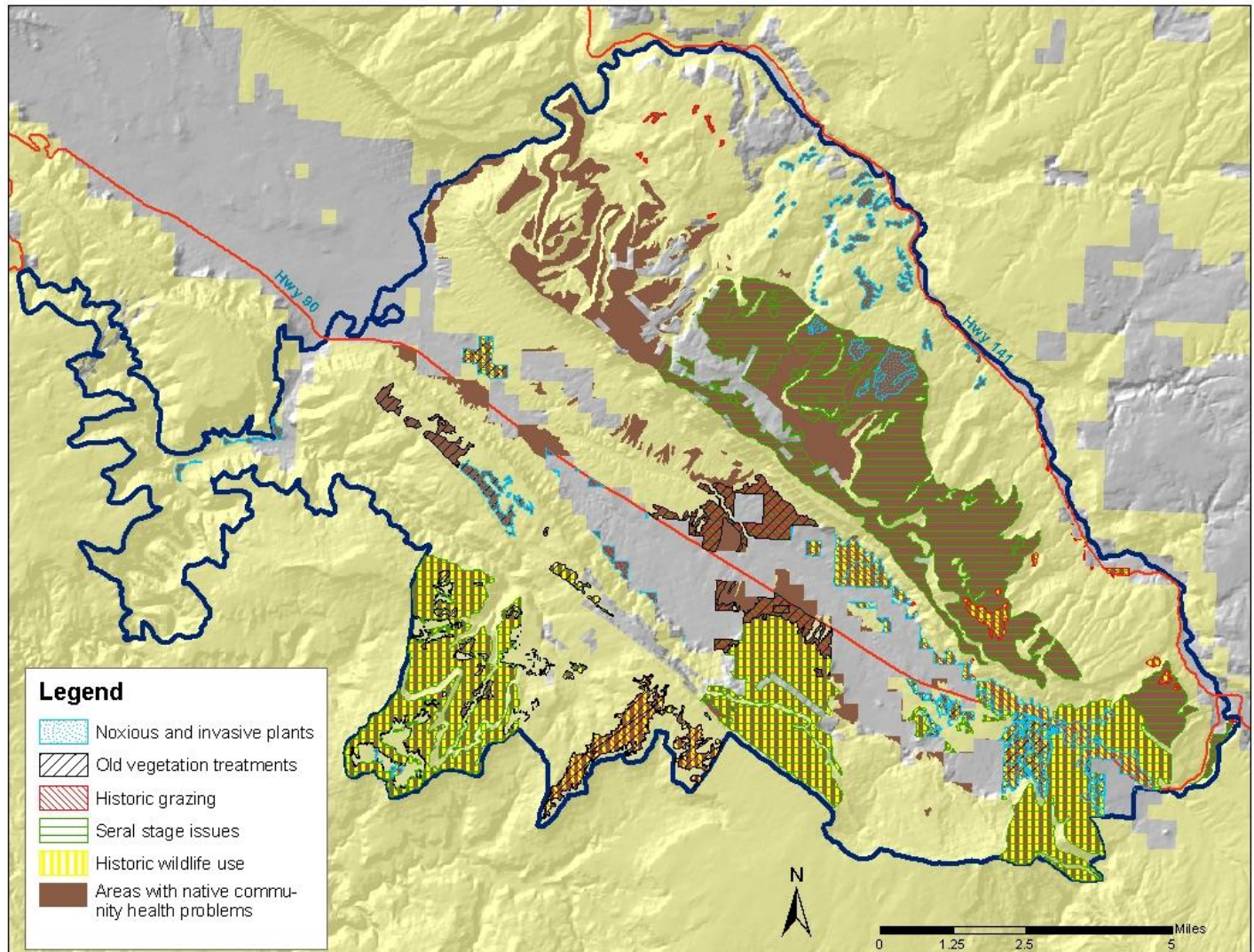
- * Abandoned mines
- * Communications sites
- * Corrals
- * Exclosures
- * Gas pipeline ROWs
- * Gas well pads
- * Active uranium mines
- * Power ROWs
- * Stock ponds
- * Road ROWs
- * Historic uranium exploration

Landscape Level:

The following types which occur on lands determined to have native plant and animal community health problems may be contributing to those problems. Their quantities on the affected lands are also shown:

- * Abandoned mines-73 total; some level of closure actions have been completed on 55 of these mines
- * Communications sites-1 site
- * Corrals-2
- * Exclosures-3
- * Gas pipeline ROWs-2.6 miles
- * Gas well pads-8
- * Active uranium mines-7
- * Power ROWs-22 miles
- * Stock ponds-14
- * Road ROWs-7 miles CDOT+53 miles Montrose County

Figure 11. Locations of the generalized causal factors and lands with native plant and animal community health concerns within the East Paradox unit.



The table below shows acreages of the Generalized Causal Factors within areas having native community health problems.

Causal Factor	Acres	Percent of Area
Historic livestock grazing	4,479	16%
Noxious and invasive weeds	3,314	12%
Seral Stage issues	19,264	70%
Old vegetation treatments	3,709	13%
Historic wildlife use	11,340	41%
Total Acres	27,609	100%

STANDARD 4 SPECIAL STATUS SPECIES: CAUSAL FACTORS

Definition: Generalized causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with Special Status Species (TES) health problems, and are likely influencing TES health most broadly across the East Paradox unit. Site specific contributing factors are defined as the remaining conditions observed at significant levels (moderate or higher) at individual study sites which have TES health problems. Development analysis identifies possible links between developments and TES health.

Generalized Causal Factors

The following conditions are probably causing upland TES health problems in many places where they occur within the East Paradox unit (the percentages of sites with community health problems at which each condition occurred at significant levels is also included):

- * Historic livestock grazing-46%
- * Noxious and invasive weeds-38%
- * Seral stage issues-38%
- * Old vegetation treatments-33%
- * Historic wildlife use-46%

In riparian TES habitat, the following conditions appear to be causing aquatic TES health problems:

- * Flow regulation from dams-100%
- * Noxious and invasive weeds-100%
- * Water diversions-100%
- * Watershed condition-50%

There were no conditions which appeared to consistently improve upland TES conditions across the landscape unit. Healthy riparian TES habitat was associated with some conditions:

- * Flood deposition-25%
- * Wildlife use-50%

Other conditions associated with healthy streams were probably not responsible for the good conditions. See Standard 2 Causal Factors for more explanation.

Site-Specific Contributing Factors

The following land uses and environmental factors were found at one or more study sites with upland TES problems, and are contributing to conditions on those sites (percentages of sites with TES health problems at which each condition occurred as a contributing factor are also included):

- * Current wildlife use-33%
- * Drought-25%
- * Current livestock grazing-17%
- * Historic cultivation-8%
- * Mining-8%
- * Pinyon-juniper invasion-8%

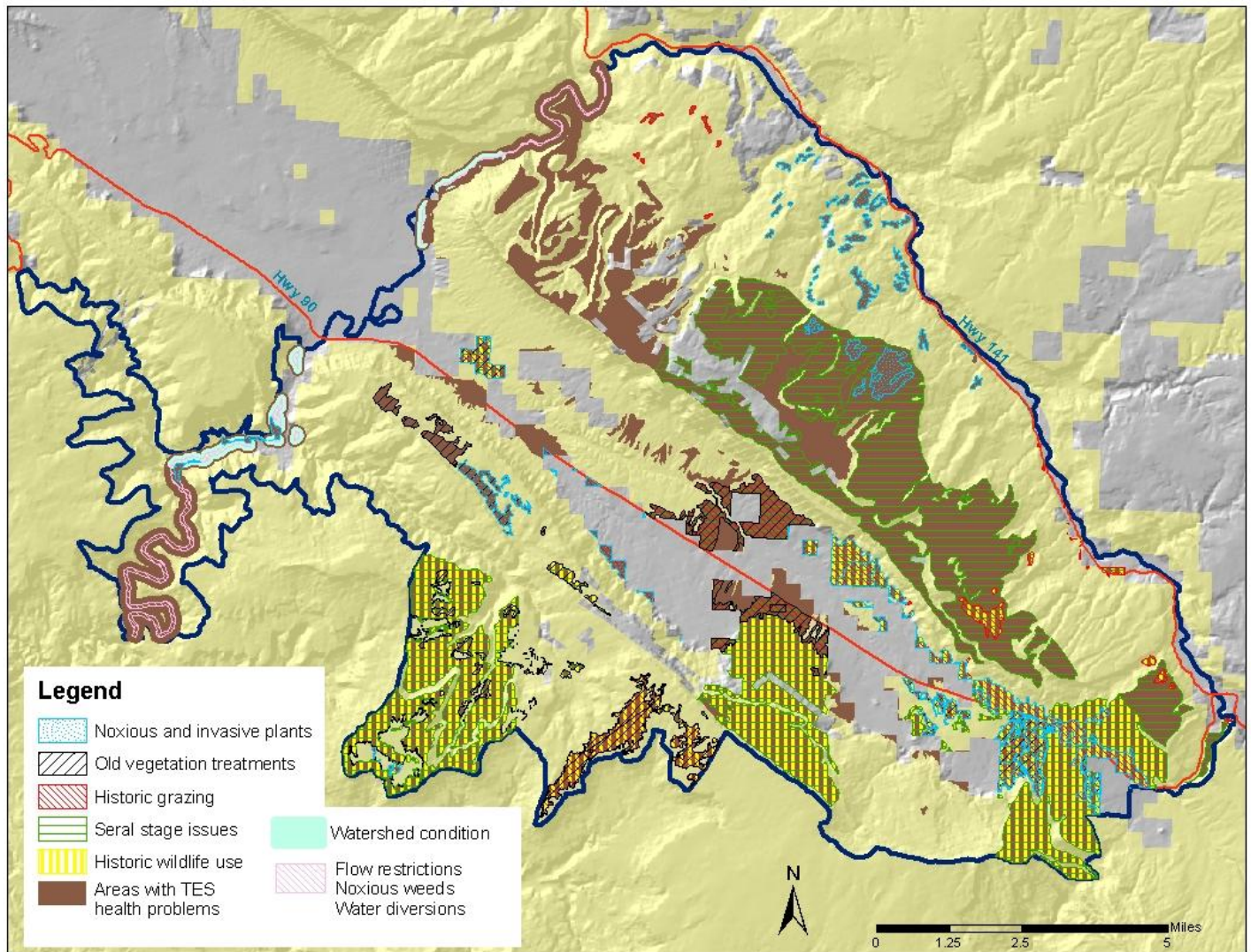
- * ROWs excluding roads-8%
- * Dumping-4%
- * Erosion from uplands-4%
- * Fire-4%
- * Fire suppression-4%
- * Stock ponds-4%
- * BLM roads-4%

There were no contributing factors in areas with riparian TES habitat problems:

Development Analysis

Except for general impacts to native vegetation and habitat as explained under Standard 3, there are no developments which were found to be associated with land health and TES indicator concerns at the site level. Limited concerns regarding rare bats and plants were noted at a small fraction of abandoned mines and BLM roads but these were not considered to rise to the level of a land health problem.

Figure 12. Locations of the generalized causal factors and lands with TES health concerns within the East Paradox unit.



The table below shows acreages of the Generalized Causal Factors within areas having TES health problems.

Causal Factor	Acres	Percent of Area
Historic livestock grazing	4,479	16%
Noxious/invasive weeds	3,314	12%
Seral Stage issues	19,264	69%
Old vegetation treatments	3,709	13%
Historic wildlife use	11,340	40%
Flow regulation/dams	489	2%
Water diversions	489	2%
Noxious/invasive weeds	489	2%
Watershed conditions	145	1%
Total Acres	28,098	100%

STANDARD 5 WATER QUALITY: CAUSAL FACTORS

Definition: Generalized causal factors are identified by analysis as those conditions which occur more frequently and at higher levels in lands with water quality problems, and are likely influencing water quality most broadly across the East Paradox unit. Site specific contributing factors are defined as the remaining conditions observed at significant levels (moderate or higher) at individual study sites which have water quality problems. Development analysis identifies possible links between developments and water quality.

Generalized Causal Factors

The following conditions are probably causing water quality problems in many places where they occur within the East Paradox unit (the percentages of sites with water quality problems at which each condition occurred at significant levels is also included):

- * Flow regulation-dams-67%
- * Noxious and invasive weeds-67%
- * Road encroachment-67%
- * Upstream water quality-33%
- * Wildlife use-67%
- * Geology-this area is known to have natural, highly saline seeps into the river, but the areas are not mapped in this LHA

Flood deposition is also associated with areas having water quality issues, but it is unlikely to be a cause of increased sediment, chemical, or other type of water degradation. Limited areas having water quality problems within the unit appeared to have been affected by:

- * Intermittent flow-33%
- * Dumping-33%
- * Upstream channel condition-33%

There are no conditions which appear to consistently improve water quality across the landscape unit.

Site-Specific Contributing Factors

The following land uses and environmental factors were found at one or more study sites with water quality problems, and are contributing to conditions on those sites (percentages of sites with water quality problems at which each condition occurred as a contributing factor are also included):

- * Water diversions—67%
- * Watershed condition—33%

Development Analysis

Site Specific:

The following types of developments were found to be associated with minor land health and water quality concerns at the site level:

- * Abandoned mines
- * BLM roads
- * Gas pipeline ROW
- * Active uranium mines

While the following developments only impact water quality indicators (sediment) at a moderate level, they are abundant enough in the East Paradox unit to note as an additional concern for water quality:

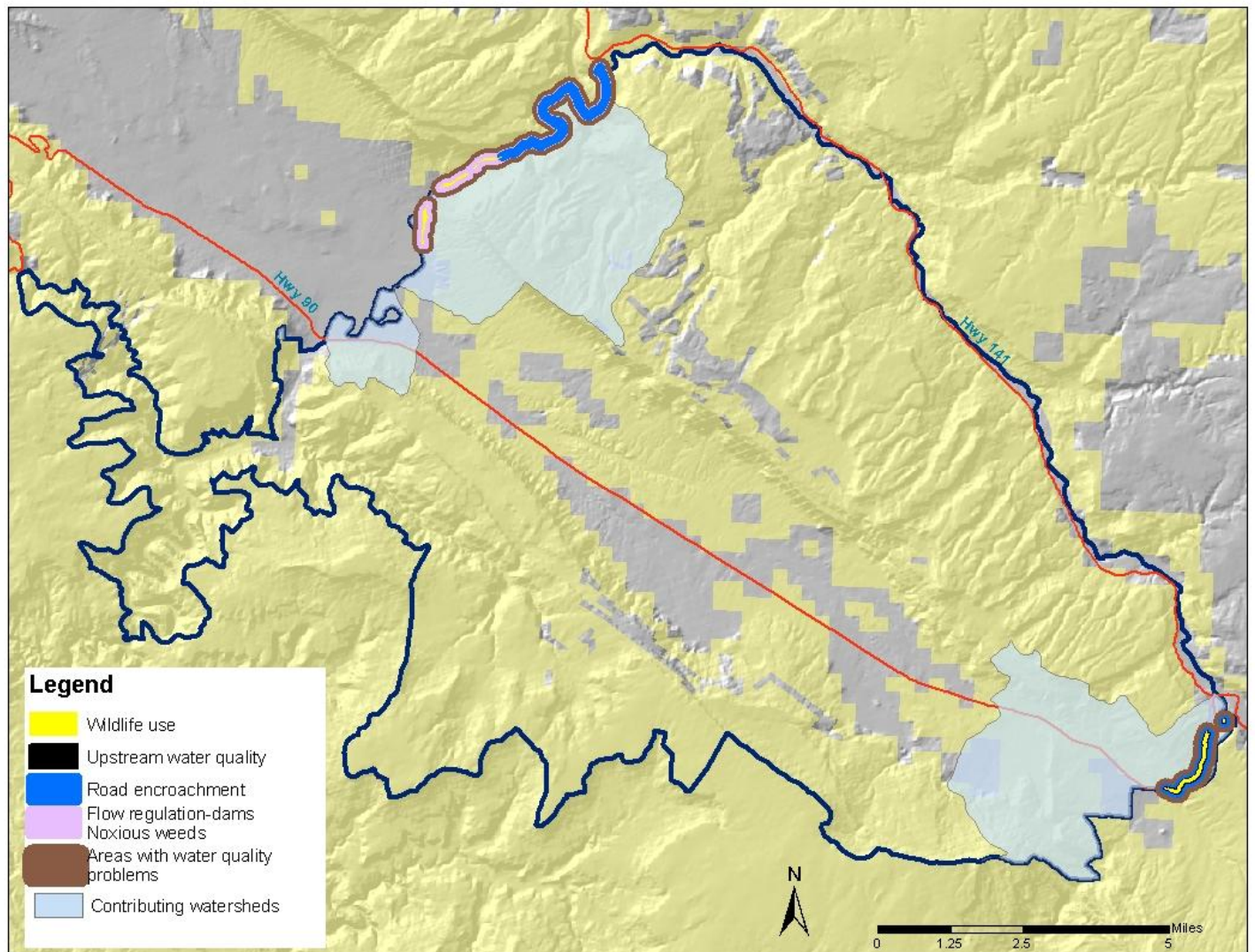
- * Road ROWs
- * Historic uranium exploration

Landscape Level:

The following developments which occur in lands determined to have water quality problems may be contributing to those problems. Their quantities in the contributing subwatershed (6th level) are also shown:

- * Abandoned mines-31 (21 have been closed to some extent)
- * BLM roads-73 miles
- * Gas pipeline ROW-3.3 miles
- * Active uranium mines-1 mine
- * Road ROWs-22 miles Montrose County, 7 miles CDOT
- * Historic uranium exploration-unmapped but extensive disturbance around Club Bench and the upper end of Paradox Valley

Figure 13. Locations of the generalized causal factors and lands with water quality concerns within the East Paradox unit.



Causal Factors

The table below shows acreages of the Generalized Causal Factors within areas having soil health problems.

Causal Factor	Acres	Percent of Area
Flow regulations-dams	94	62%
Noxious and invasive weeds	94	62%
Road encroachment	112	74%
Upstream water quality	58	38%
Wildlife use	97	64%
Total Acres	152	100%



REMEDIES: OVERVIEW

Definition: Remedies are the management actions which are needed to fix the land health problems that have been identified. They may directly address causal factors, or may simply repair damage on the ground. Remedies may take the form of revised stipulations or terms in permitted activities, proposed projects along with necessary budget requests and Proposed Action statements, or updated best management practices. Remedies may also take the form of monitoring, research, or enforcement, maintenance and compliance activities added to the Annual Work Plan (AWP), or daily work activities.

Explanation of Approach:

This Land Health Assessment is designed to promote improvement of land health conditions in the East Paradox Unit. A systematic approach was followed to identify both land health remedies and actions to reduce impacts to land health that relate to developments.

Land Health Remedies:

These remedies are directed at fixing the large scale problems which were identified during the Land Health Determinations. The approach started with identification of the types and locations of land health problems in the Determinations section. Next, the causal factors related to the problems were identified, as discussed in the Causal Factor section. Finally, remedies to address each of the causal factors were identified. This approach was used to maintain a direct linkage between suggested remedies and the specific land health problems, and to ensure that a comprehensive list of remedies is developed.

A total of 36 separate actions have been identified. Some of these apply to more than one Standard. The remedies are listed for each Standard on the following pages. Where a remedy applies to more than one Standard, a cross reference is made. The linkage between problem, cause and remedy can be found in the remedy tables for each Standard in Appendix A.

Actions to Reduce Impacts to Land Health:

These actions are targeted at ensuring developments are consistent with improving land health in areas which are determined to have problems. While BLM acknowledges the history of past land use and prior existing rights may make some changes impossible or impractical, there are many situations where improvements can be made. Actions primarily take the form of reviewing those development types which analysis suggests may impact land health at the site level. Individual developments should be reviewed in the field to identify where compliance, maintenance, or redesign would be needed to minimize those impacts. Specific developments are listed under each Standard.

STANDARD 1 SOILS: REMEDIES

Definition: Land Health Remedies are corrective actions which specifically address those Standard 1 soil indicators which showed problems (see Determinations Standard 1 section). The remedies were developed through consideration of causal and contributing Factors associated with problem indicators (see Appendix A1.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.

Land Health Remedies

Apply the following actions to these priority areas: Dolores Canyon, East Paradox, Houser, Lavender, and Sawtooth allotments, sagebrush vegetation, old interseeds and plow and seeds. The actions are listed in no particular order of priority:

- * 1A. Revise livestock grazing permit terms to include 50% seasonal utilization limits, active growing season duration limits of 15 days, and incorporate rest.
- * 1B. Increase compliance monitoring and enforcement of grazing permit terms.
- * 1C. Continue weather and climate monitoring to be better prepared for droughts and correspondingly modify management early in the drought.
- * 1D. Increase weed management efforts on A and B list species.
- * 1E. Seed disturbances with desirable native species to prevent weeds from becoming established.
- * 1F. Revegetate or restore areas that have been dominated by annual weeds or introduced species.
- * 1G. Avoid future treatments that cause excessive soil disturbance or establish monocultures.
- * 1H. Reduce amounts of early and late-mid seral stages which lead to soil loss.
- * 1I. Manage fire to better simulate natural disturbance regime as much as possible- review and update UFO Fire Plan to incorporate this direction.
- * 1J. Treat vegetation to simulate fire effects and achieve a more natural mosaic of seral stages.
- * 1K. Keep CDOW aware of browse stand condition and wildlife use levels.
- * 1L. Incorporate mitigating measures when revegetating fires or otherwise treating vegetation to reduce damaging effects of elk, deer and prairie dog concentrations.
- * 1M. Keep erosion BMPs current and require on all authorizations.

- * 1N. Improve compliance through better coordinating field staff to improve detection of problems, developing accurate GIS layers.
- * 1O. Fence around ponds where feasible to achieve better livestock distribution and compliance with permit terms.
- * 1P. Identify erosion conditions on BLM roads, add data to GPS roads map for use during travel planning, and identify immediate maintenance needs such as construction of waterbars, etc. Request funding to implement.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas (lands “meeting standard 1 with problems”), assess the following developments for condition and compliance relative to Standard 1 indicators. The developments are listed in no particular order of priority:

- * AML sites Davis Mesa #37, #47—ensure that mine reclamation plans properly address soil erosion and groundcover.
- * 68 miles of BLM roads—identify erosion conditions and corrective actions as noted above under 1P.
- * The grazing enclosure (RIPS 230282)—if no longer needed for monitoring or livestock management, remove to reduce unnecessary livestock concentration or trailing impacts.
- * The gas pipeline ROW (COC 13661) where it crosses soil problem polygons—determine if mitigation still effective or required, additional measures needed to reduce erosion, and responsible party.
- * Uranium exploration disturbances in soil problem polygons—if causing excessive erosion, Identify corrective measures and request funding to implement.
- * Improve and/or maintain the waterbars along gas pipeline COC-13661.
- * Repair or relocate spillway on stock ponds DP-57, DP-58, DP-61, DP-64, DP-66

STANDARD 2 RIPARIAN: REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 2 riparian indicators which showed problems (see Determinations Standard 2 section). The remedies were developed through consideration of causal and contributing Factors associated with problem indicators (see Appendix A2.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.*

Land Health Remedies

Apply the following actions to streams and rivers in these priority areas along the Dolores River: Dolores Canyon, Mesa Creek, Lasal Creek, and Sawtooth allotments, and the WSA. These actions are listed in no particular order of priority:

- * 2A. Work with Dolores River group and Colorado Water Conservation Board to pursue flows on the Dolores River that will better simulate the natural hydrograph
- * 2B. Increase management of Colorado A and B list weeds along riparian areas.
- * 2C. Continue involvement in Dolores River Restoration group to collaboratively work on weeds and restoration of native riparian species throughout the river corridor.
- * 2D. Monitor effects of tamarisk beetle on tamarisk, and treat secondary weeds if they increase .
- * 2E. Communicate with Montrose County Road Department about minimizing road widening activities into riparian areas, and pushing debris into stream channels.
- * 2F. (same as 1M) Keep erosion BMPs current and require on all authorizations.
- * 2G. (same as 1P) Identify erosion conditions on BLM roads, add data to GPS roads map for use during travel planning, and identify immediate maintenance needs such as construction of waterbars etc. Request funding to implement.
- * 2H. Uranium exploration disturbances—if causing excessive erosion, identify corrective measures and request funding to implement.
- * 2I. Include measures to mitigate wildlife damage when revegetating riparian areas (such as protective caging around cottonwoods).

Development Analysis: Actions to Reduce Impacts to Land Health

There were no developments which were found to be associated with land health and riparian indicator concerns at the site level. No corrective measures are needed.

STANDARD 3 NATIVE PLANT AND ANIMAL COMMUNITIES: REMEDIES

Definition: Land Health remedies are corrective actions which specifically address those Standard 3 plant and animal community indicators which showed problems (see Determinations Standard 3 section). The remedies were developed through consideration of causal and contributing factors associated with problem indicators (see Appendix A3.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.

Land Health Remedies

Apply the following actions to these priority areas: Davis Mesa, Lavender, Dolores Canyon, East Paradox, Houser, and Sawtooth, allotments, sagebrush, pinyon-juniper, and all vegetation treatment types. The actions are listed in no particular order of priority:

- * 3A. Revegetate or restore areas that have been dominated by annual weeds or introduced species. Use a diverse mix of native species.
- * 3B. (same as 1I) Manage fire to better simulate natural disturbance regime as much as possible- review and update UFO Fire Plan to incorporate this direction.
- * 3C. (same as 1J) Treat vegetation to simulate fire effects and achieve a more natural mosaic of seral stages.
- * 3D. Include appropriate species and variety of 4-wing saltbush and/or sagebrush seed when revegetating areas which can support those species, unless objective is to create an early seral community.
- * 3E. (same as 1C) Continue weather and climate monitoring to be better prepared for droughts and correspondingly modify management early in the drought.
- * 3H. (same as 1K) Keep CDOW aware of browse stand condition and wildlife use levels.
- * 3I. (same as 1L). Incorporate mitigating measures when revegetating fires or otherwise treating vegetation to reduce damaging effects of elk, deer and prairie dog concentrations.
- * 3J. (same as 1D) Increase weed management efforts on A and B list species.
- * 3K. (same as 1E) Seed disturbances with desirable native species to prevent weeds from becoming established.
- * 3L. (same as 1F) Revegetate or restore areas that have been dominated by annual weeds or introduced species.
- * 3M. (same as 1G). Avoid future treatments that cause excessive soil disturbance (destroy soil biota) or establish monocultures.
- * 3N. (similar to 1A) Revise livestock grazing permit terms to include 50% seasonal utilization limits, active growing season duration limits of 15 days, incorporate rest, provide for rest of vegetation treatments, and minimize use of Spring and Fall grazing of the same area within the same year.
- * 3O. (same as 1B) Increase compliance monitoring and enforcement of grazing permit terms.
- * 3P. Keep revegetation BMPs current and designed to establish appropriately functioning, diverse vegetation communities. Require on all authorizations which disturb the soil and/or vegetation community.
- * 3Q. (same as 1N) Improve compliance through better coordinating field staff to detect problems, and through developing accurate GIS layers.
- * 3R. (same as 1O). Fence around ponds where feasible to achieve better livestock distribution and comply with permit terms.
- * 3S. Identify erosion and weed conditions, add data to GPS roads map for use during travel planning, and identify immediate maintenance needs and weed control needs. Roads should be a priority for weed control because they facilitate seed dispersal.
- * 3T. Include grazing permit term that requires grazing to be done in a manner that does not spread weeds, and requires weed control on range improvements covered by Cooperative Agreements.
- * 3U. Require weed control on new and renewing ROWs.
- * 3V. Stock ponds are a priority for weed treatment because they have a high probability for weed seed dispersal.

STANDARD 3 REMEDIES

Development Analysis: Actions to Reduce Impacts to Land Health

In priority A areas (lands “not meeting” Standard 3), and priority B areas (lands “meeting Standard 3 with problems”), assess the following authorizations and user created areas for condition and compliance relative to Standard 3 indicators. The developments are listed in no particular order of priority:

Priority A:

- * East Paradox Exclosure #2. Remove if no longer needed.
- * Gas pipeline ROW COC 13661, evaluate for adequate revegetation.
- * Gerard-Mullen 1 gas well, evaluate for weeds, revegetation, and adequate closure of drill hole.
- * Powerline ROWs COC#72184, 68253, 38375, 29789; evaluate poles for measures to prevent bird electrocution.
- * Stock ponds Rock Reservoir, and RIPS# 230779, 235227, 235170, 235226, 230271, 235271, 233521, 235377, 231098; evaluate for weeds and adequate revegetation.
- * Highway ROW COC14073; evaluate for weeds.
- * County road ROWs EE22, EE21, DD16, EE16, HH14, Z12, BB16, CC17, DD19; evaluate for weeds.

Priority B:

- * Abandoned mines-73 total; some level of closure actions have been completed on 55 of these mines, names available in GIS; evaluate for weeds.
- * Communications site ROWs COC 31384, 36672; evaluate for bird strike hazard.
- * Corrals-East Paradox Corral and Monogram Mesa Corral; evaluate for weeds and wildlife hazard.
- * Exclosures-East Paradox Exclosure RIPS # 230346; evaluate for weeds and wildlife hazard, remove if not needed.
- * Gas pipeline ROW COC 13661; evaluate for adequate revegetation.
- * Gas wells: 05-085-0517, 05-085-06013, 05-085-06037, 05-085-06040, 05-085-06038, 05-085-06042, 05-085-06041; evaluate for weeds, revegetation, and adequate closure of drill hole.
- * Active uranium mines-COC62522, 70985, 60321, 73013, 71183, 72089, 72986, and

DOE-LP; evaluate for wildlife hazards and adequate revegetation.

- * Powerline ROWs-COC 27679, 31653, 72184, 68253, 38375, 22295, 38376, 29789; evaluate poles for measures to prevent bird electrocution.
- * Stock ponds-Richards #5, 7, 11, Eagle Canyon and Eagle Canyon #2, Burro, West Draw, East Paradox, and RIPS# 231368, 234429, 234430, 234431, 234432, 231352, 231354, 231211, 230735, 230733, 230734, 231574, 235187, 231101, 230975, 230972, 231475, 235171, and 231150; evaluate for weeds and adequate revegetation.
- * Road ROWs Highway COC 04672 and 14073; evaluate for weeds.
- * County road ROWs-AA18, BB16, CC17, DD15, DD16, DD19, DD20, EE12, EE13, EE16, EE17, EE18, EE19, EE21, EE22, FF12, FF13, FF15, FF16, GG11, GG13, GG17, HH14, U16, W15, W19, Y11, Z12, Z17; evaluate for weeds.
- * Review Buckshot group AML closures for revegetation success.
- * Control weeds in Bedrock Boat Ramp area., corrals DP-29, DP-30.
- * Repair wires on East Paradox Exclosures to reduce wildlife hazard.
- * Reseed the disturbed area around Cabot Sabertooth gas well.
- * Highway 90 and 141 ROWs and Montrose County Roads need more regular weed control.
- * Check powerline ROW COC-30187 for functionality and use, and remove if unnecessary.
- * Control weeds on East Paradox Reservoir, LP Reservoir #3, Trap Reservoir, Richards Stock Pond #2, Monogram Mesa Reservoir, Eagle Canyon Reservoir, West Draw Reservoir.
- * Treat weeds along Telephone ROW COC-28680.

STANDARD 4 SPECIAL STATUS SPECIES (TES¹): REMEDIES

Definition: *Land Health Remedies are corrective actions which specifically address those Standard 4 TES indicators which showed problems (see Determinations Standard 4 section). The remedies were developed through consideration of causal and contributing factors associated with problem indicators for Standard 2 and Standard 3 (see Appendix A2.6 and 3.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.*

Land Health Remedies

The actions listed under Standards 2 and 3 apply to Standard 4.

Development Analysis: Actions to Reduce Impacts to Land Health

The developments listed under Standard 2 and 3 Remedies section also apply to Standard 4.

STANDARD 5 WATER QUALITY: REMEDIES

Definition: Land Health Remedies are corrective actions which specifically address those Standard 5 water quality indicators which showed problems (see Determinations Standard 5 section). The remedies were developed through consideration of causal and contributing factors associated with problem indicators (see Appendix A5.6.) Many remedies address multiple causes and more than one indicator. Some remedies address more than one Standard as well.

Land Health Remedies

Apply the following actions to these priority areas: the Dolores River-especially in Mesa Creek allotment, Dry Creek in Sawtooth allotment, and areas not meeting Standards from the 1999 LHA. The actions are listed in no particular order of priority:

- * 5A. Identify and monitor areas where stream-banks appear to be exceptionally salty, modify revegetation plans to include salt-tolerant species.
- * 5B. (same as 2A) Work with Dolores River group and Colorado Water Conservation Board to pursue flows that will better simulate the natural hydrograph and/or reduce salinity.
- * 5C. (same as 2C.) Continue involvement in Dolores River Restoration group to collaboratively work on weeds (specifically tamarisk which transports salts to the soil surface) and restoration of native riparian species throughout the river corridor.
- * 5D. (same as 2D.) Monitor effects of tamarisk beetle on tamarisk, and treat secondary weeds if they increase.
- * 5E. Research opportunities or mechanisms to flood river terraces once tamarisk have been removed or killed to reduce salt on the soil surface.
- * 5F. (same as 2E) Communicate with Montrose County Road Department about minimizing road widening activities into riparian areas, and pushing debris into stream channels.
- * 5G. Cooperate with state agencies to continue monitoring water quality in the San Miguel River below Uravan to track pollutants from the UMETCO superfund site.
- * 5H. (same as 2A.) Work with Dolores River Instream Flow Partnership (DRIP) group and Colorado Water Conservation Board to pursue flows that will better simulate the natural hydrograph.
- * 5I. (same as 1M) Keep erosion BMPs current and require on all authorizations .
- * 5J. (same as 1P) Identify erosion conditions on BLM roads, add data to GPS roads map for use during travel planning, and identify immediate maintenance needs such as construction of waterbars etc. Request funding to implement.
- * 5K (same as 2H.) Review uranium exploration disturbances in soil problem polygons—if causing excessive erosion, identify corrective measures and request funding to implement.
- * 5L Implement Standard 1 soil actions in contributing subwatersheds.

Development Analysis: Actions to Reduce Impacts to Land Health

In priority areas (the subwatersheds around lands “meeting standard 5 with problems”), assess the following developments for condition and compliance relative to Standard 5 indicators. The developments are listed in no particular order of priority:

- * Abandoned mines-31 total , with some level of closure actions completed on 21 of these mines, all names available in GIS; evaluate for adequate capping of spoil piles and other sources of water pollution, and for adequate revegetation.
- * BLM roads-(same as action 5J.). Also waterbars needed on DP-13, and DP10. Closures recommended for DP-10, DP-11 and DP-15 if routes not needed.
- * Gas pipeline ROW-Gas pipeline ROW COC 13661, focus on the 3.3 miles that falls within the Dry Creek subwatershed along Sawtooth Ridge; assess for adequate erosion control.
- * Active uranium mines-COC 72896; evaluate for adequate capping of spoil piles and other sources of water pollution, and for adequate revegetation.
- * Historic uranium exploration-(same as action 5K.)
- * Reclaim AML sites DP-2, 5, and 90 by covering waste rock pile, rehabilitating and reseeding. Block access off of County Roads to old uranium exploration roads: DP83-DP87.